RAILROAD GAZETTE

FRIDAY, MAY 28, 1880.

Improved Wood-burning Smoke-Stacks.

There is hardly any part of a locomotive on which so much ingenuity has been expended as the construction of the chimneys or smoke-stacks, or rather the spark-arresters. Notwithstanding the general use of coal on nearly all the principal lines, there are still many roads on which wood is the fuel used. For this reason, an illustration and description of an improved wood-burning smoke-stack will be of interest to many readers. The illustrations represented, are designed and used by Mr. L. Finlay, of the St. Louis Iron Mountain & Southern Railway. Fig. 1 represents a section of the outside casing; fig. 3, a section, and fig. 4 an inverted plan of the deflector. From these illustrations it will be seen that there is the usual outside casing, *A A A*, and inside pipe, *B*. On top of the latter is a cast-iron deflector, *D D*. The bottom of this casting has an opening which corresponds with the inside of the pipe *B*, but the top consists of a conical deflector, *C C*. Between the top and bottom are radial deflectors *E E E*, the form of which is shown in the inverted plan fig. 4. To the upper part of this deflector is attached a wire netting, *F F* of conical form, which extends to the outside of casing at *G G*. The smoke and sparks ascend through the inside pipe *B*. and the latter then strike against the cone *C C* and are deflected outward against the radial deflectors *E E*, and then pass into the space *H H*, and thence out through the wire netting. By this process it is thought that the sparks are broken up and detained so long that they are no longer incandescent when they escape. The larger and heavier ones are dissipated in the space *H H* from which they can be removed through a suitable opening not shown in the engraving.

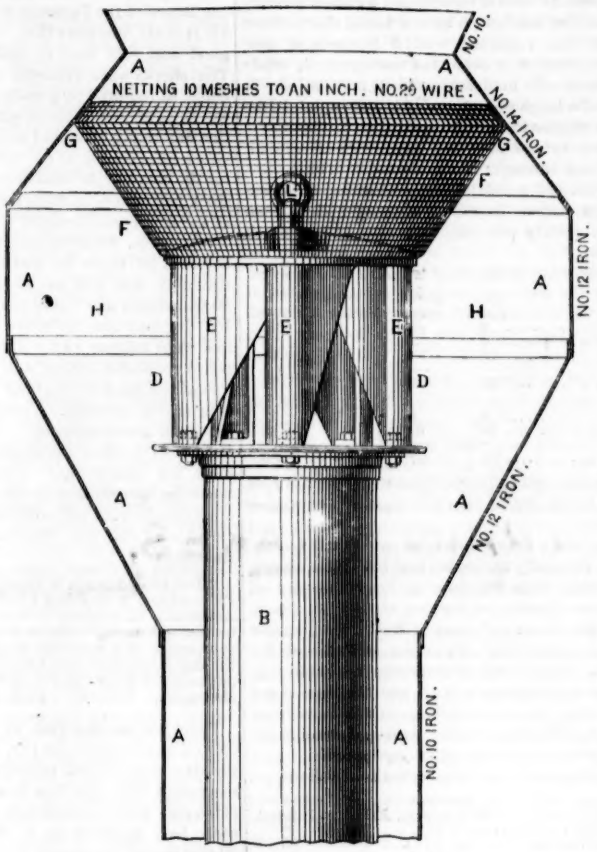


Fig. 1.

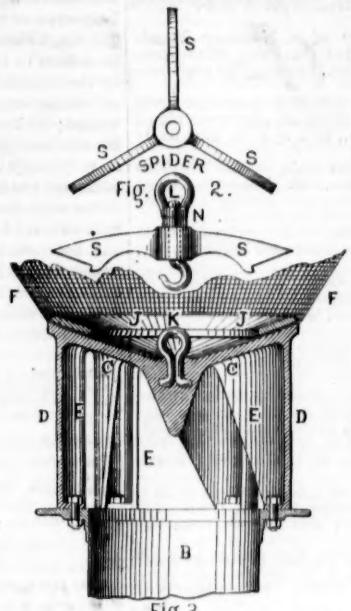


Fig. 3.
SECTION OF DEFLECTOR.

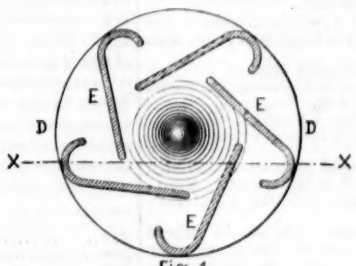


Fig. 4.
INVERTED PLAN OF DEFLECTOR.

SCALE.
0 1 2 3 4 5 6 7 8FT.

IMPROVED WOOD-BURNING SMOKE-STACK.

The wire netting is attached to the deflector by a ring, *J J*. This is held down by a "spider," *S S*, which is fastened by a hook to an eye, *K*, which is cast in the cone. The spider is screwed down on the ring by a nut, *N*, and the eye, *L*, is intended to attach a block and tackle to hoist up the stack. Mr. Finlay writes: "You will notice how simple the connection is found between the cone and netting, one bolt securing them and making the hoisting attachment as well. No bracing is required to steady the cone and inside pipe. as the netting is so arranged as to stay the outer and inner parts together."

This stack is not patented. It has been in use for four years and has given good satisfaction on engines for hauling trains carrying cotton, which is more liable to take fire than almost any other kind of freight.

Train Accidents in April.

The following accidents are included in our record for the month of April:

REAR COLLISIONS.

Very early on the morning of the 4th an express train on the Cincinnati, Indianapolis, St. Louis & Chicago road ran into some box cars which had been left on the main track near Indianapolis, Ind. The engine was slightly damaged and the freight cars wrecked.

On the night of the 5th a passenger train on the Northern Central road ran over a misplaced switch and into another passenger train standing on a siding at Union Depot in Baltimore. One engine was thrown over on its side and the baggage-car was also upset, injuring the baggage-master fatally and another man slightly.

On the 6th a passenger train on the Lehigh Valley road ran into the rear of a coal train at Coalport, Pa. The passenger engine was damaged, six coal cars thrown down into the canal and wrecked, and the fireman hurt.

On the night of the 7th a freight train on the Denver, South Park & Pacific road broke in two near Kenosha Summit, Col., and the detached cars afterward ran into the forward ones, throwing both engines over, breaking several cars, killing one engineer and injuring the other.

On the evening of the 13th a freight train on the New York & New England road ran into a preceding freight in East Hartford, Conn., wrecking the engine and several cars and blocking the road all night.

On the 15th a freight train on the New York & New England road ran over a misplaced switch and into some cars standing on a siding in East Hartford, Conn., wrecking several cars.

Early on the morning of the 18th a freight train on the Kansas Division of the Union Pacific road ran into some cars which had broken loose from a preceding freight near Wallace, Kan., wrecking six cars, damaging the engine, injuring the fireman and blocking the road four hours.

On the 20th a passenger train on the Cincinnati, LaFayette & Chicago road ran into a freight car which had been blown from a siding partly out upon the main track at Templeton, Ind. The car and the passenger engine were damaged.

Very early on the morning of the 21st a freight train on the Boston & Albany road ran into a preceding freight which had stopped at West Brimfield, Mass., for water. The engine and several cars were damaged and the road blocked four hours.

On the 24th a freight train on the New York, Lake Erie & Western road ran into a preceding freight, which had stopped at Hunt's, N. Y., wrecking the caboose and injuring the conductor.

Early on the morning of the 25th a freight train on the New York Central & Hudson River road ran into the rear of another freight near Batavia, N. Y., damaging an engine and several cars. The wreck caught fire and six cars were burned up.

On the night of the 26th a freight train on the Chesapeake & Ohio road ran into the rear of a preceding freight near Waynesboro, Va. The engine and 15 cars were wrecked, the fireman killed and the engineer hurt. The road was blocked eight hours.

On the 29th a freight train on the Richmond & Danville road ran into the rear of a repair train near Burkeville, Va., wrecking several cars. The fireman was badly hurt and the road blocked several hours.

On the 29th a freight train on the Utah Southern road ran into the rear of a construction train near Battle Creek, Utah, wrecking several cars.

On the evening of the 30th a pusher engine on the New York Central & Hudson River road ran into the rear of a freight train near Rochester, N. Y., damaging the caboose.

BUTTING COLLISIONS.

Very early on the morning of the 9th there was a butting collision between two freight trains on the Baltimore & Ohio road in Zanesville, O. Both engines and 13 cars were wrecked, blocking the track all day.

On the 15th there was a butting collision between a freight train and a yard engine on the Ft. Wayne & Jackson road, in Jackson, Mich., by which both engines were damaged.

On the morning of the 20th there was a butting collision between two freight trains on the Columbus, Chicago & Indiana Central road near New Madison, O. Both engines were damaged.

On the night of the 22d there was a butting collision between a passenger and a freight train on the Ohio & Mississippi road at Shoals, Ind. Both engines were wrecked, several freight cars badly broken and three trainmen hurt. The freight was using the main track, although the passenger train was due.

About noon, on the 23rd, there was a butting collision between a Toledo, Peoria & Warsaw freight train and an Indiana, Bloomington & Western yard engine in Peoria, Ill., by which both engines were damaged.

On the night of the 25th a freight train on the Wabash, St. Louis & Pacific road broke in two near West Lebanon, Ind., and the detached cars ran back down grade and into the head of a following freight train. The engine and several cars were wrecked.

On the 29th a passenger train on the Ohio & Mississippi road ran into the head of another passenger train which was just going into a siding at Wheatlands, Ind. Some damage was done, and the road blocked four hours. A trainman was hurt.

On the 30th there was a butting collision between two repair trains on the New Orleans, Mobile & Texas road near Pearl River, Miss., doing damage and killing a fireman.

CROSSING COLLISIONS.

Very early on the morning of the 6th a Michigan Central switching train ran into a Lake Shore yard engine, at the crossing near the Grand Trunk Junction in Detroit. Both engines were damaged. The signal is said to have been in favor of the Lake Shore engine.

On the 20th a passenger train on the Wabash, St. Louis & Pacific road ran into a freight train on the Chicago & Eastern Illinois at the crossing of the two roads in Danville, Ill. The Wabash engine and postal car and several flat cars of the other train were badly damaged, and a mail agent hurt.

Verly early on the morning of the 24th a Mobile & Ohio freight train ran into an Alabama Great Southern freight at the crossing of the two roads in Meridian, Miss. The Great Southern tender and two cars were thrown over; the Mobile & Ohio engine upset and several cars were piled up on top of it in a bad wreck, blocking both roads nearly 12 hours.

DERAILMENTS, BROKEN RAIL.

Very early on the morning of the 15th a passenger train on the Ohio & Mississippi road struck a broken rail near Shoals, Ind., and the engine and three cars went down a low bank. The engine landed in a mud-hole, the cars upset and one was badly broken. Seven passengers were hurt, only one badly.

On the 28th a passenger train on the Springville & Sardinia road struck a broken rail near Sardinia, N. Y., and the engine was thrown from the track and badly damaged, injuring the fireman.

DERAILMENT, BROKEN WHEEL.

On the afternoon of the 18th a wheel broke under a car in an ore train on the Central Railroad, of New Jersey, when near Springtown, N. J., and 15 cars were piled up in a bad wreck, blocking both tracks several hours.

DERAILMENT, BROKEN AXLE.

Early on the morning of the 23d a freight train on the Rensselaer & Saratoga road was thrown from the track near Round Lake, N. Y., by the breaking of an axle under the tender, and 16 cars were piled up together in a bad wreck. Some of the cars were completely broken up, several horses were killed and others hurt. A brakeman was badly injured.

DERAILMENT, BROKEN BRIDGE.

On the morning of the 13th, as an express train on the Kansas Division of the Union Pacific was running very fast near Sheridan, Kan., on rounding a curve the engineer saw a bridge on fire a short distance ahead. He put on the air-brakes and then jumped, but the engine went down into the ravine, breaking through the burning bridge and falling 35 feet. The mail, baggage and express cars went down on top of the engine. All the passenger cars remained on the track, the air-brakes having stopped them just in time.

DERAILMENT, WASH-OUT.

Very early on the morning of the 6th an express train on the New York, New Haven & Hartford road was thrown from the track near Meriden, Conn., where an embankment through a small swamp had suddenly sunk down, leaving the track almost without support. The engine passed over, but the mail-car upset and rolled down into a pond, with the baggage-car on top of it, and the passenger cars also left the track. Three trainmen were slightly hurt.

DERAILMENTS, SNOW.

On the morning of the 16th a snow-plow with eight engines ran off the track in a snow-drift near Summit, Cal., doing much damage.

On the 13th the engine of a passenger train on the St. Paul, Minneapolis & Manitoba road ran off the track in a snow-bank near St. Cloud, Minn., doing no serious damage.

DERAILMENTS, CATTLE.

On the night of the 23d a repair train on the Atlantic, Mississippi & Ohio road ran over a cow near Ivor, Va., and the engine, which was running backward, was thrown over down a bank, with several cars after it. The conductor and a laborer were killed; the engineer and fireman badly hurt.

On the afternoon of the 27th a passenger train on the Boston & Albany road ran over a cow which had strayed on the track near Brighton, Mass., throwing one car from the track.

DERAILMENTS, ACCIDENTAL OBSTRUCTION.

On the evening of the 1st a passenger train on the Philadelphia & Reading road struck a heavy plank which had been dropped on the track at Swedeland, Pa., a moment before, by some men at work on a building just beside the track. The engine was upset and badly broken, and several cars were thrown across the road, blocking both tracks several hours.

On the 6th a freight train on the Central Vermont road was thrown from the track near Hartford, Vt., by a drawhead which pulled out and fell on the rails. Six cars were badly broken and the road blocked several hours.

On the 17th, as a repair train on the Utah & Northern road was running backward near Richmond, Utah, two cars were thrown from the track by a rock which had fallen on the rails. The two cars were upset, injuring a brakeman fatally and the track foreman less severely.

On the night of the 18th a freight train on the Missouri Pacific road ran into a small house which had been blown upon the track by a tornado at Gray's Creek, Mo. The engine was upset and badly broken, injuring the engineer, and fireman hurt.

On the 24th a freight train on the New York & New England road was thrown from the track near Blackstone

Mass., by a brake rod, which broke in two and fell on the rails. Two cars went over the bridge over the Blackstone River and several others went down a high bank and were badly broken.

DERAILMENTS, MISPLACED SWITCH.

On the 1st a local freight train on the Philadelphia & Reading road was thrown from the track by a misplaced switch near East Mahanoy Junction, Pa., and the engine and several cars were badly broken.

On the morning of the 8th the engine of a passenger train on New York, Lake Erie & Western road was thrown from the track by a misplaced switch in the yard at Paterson, N. J., causing some delay.

On the night of the 21st a freight train on the Cincinnati, LaFayette & Chicago road was thrown from the track by a misplaced switch at Sheldon, Ill. The engine was upset, three cars wrecked, and the station platform torn up for a 100 feet.

On the evening of the 22d a passenger train on the Philadelphia & Reading road was thrown from the track in Pottsville, Pa., by a misplaced switch, doing some damage.

On the afternoon of the 27th a passenger train on the Cleveland & Pittsburgh road was thrown from the track near Steubenville, O., by a misplaced switch.

DERAILMENTS, UNEXPLAINED AND MISCELLANEOUS.

On the morning of the 1st a passenger train on the Pittsburgh Southern road ran off the track at Simmon's, Pa., wrecking the rear car, injuring a brakeman and a passenger.

On the 1st an express train on the Intercolonial road ran off the track near Debert Bridge, N. S., and one of the two engines which were drawing the train went over the bridge and was wrecked.

On the night of the 1st, two cars of a Northern Pacific freight train ran off the track on the St. Paul, Minneapolis & Manitoba track in St. Paul, Minn., blocking the road several hours.

On the evening of the 2d, three cars of a passenger train on the Kansas City, Lawrence & Southern road were blown from the track near Ottawa, Kan., by a cyclone and badly broken, and injuring a passenger.

On the night of the 2d, a freight train on the Southern Pacific ran off the track at Cabazon, Cal. The engine upset and 19 cars were piled up in a bad wreck, killing a tramp who was stealing a ride, and injured a brakeman.

On the morning of the 5th the engine of a passenger train on the Missisquoi road ran off the track near Richford, Vt., blocking the road several hours.

On the morning of the 6th four cars of a mixed train on the Ware River Branch of the Boston & Albany road ran off the track near Coldbrook, Mass., blocking the road several hours.

On the morning of the 8th the engine of a freight train on the Denver, South Park & Pacific road ran off the track near Grant, Col., and was damaged.

On the night of the 8th a car on a passenger train on the Bellaire & Southwestern road ran off the track on a trestle near Jacobsburg, O., and fell from the trestle to the ground. The car was wrecked, two passengers seriously and two slightly hurt. A similar accident happened a few weeks ago on this road.

On the morning of the 9th a car loaded with iron in a freight train on the Pittsburg, Cincinnati & St. Louis road broke down near Denison, O., and was thrown from the track, killing a brakeman.

On the 10th a passenger train on the New Brunswick road ran off the track near Hartland, N. B., and two cars were upset, one of them being badly broken. Five passengers were hurt, only one badly.

On the 10th the engine of a local freight train on the Lake Shore & Michigan Southern road ran off the track in Stoneboro, Pa., and was damaged considerably.

On the night of the 11th a car of a passenger train on the Macon & Brunswick road ran off the track near Sand Hill, Ga.

On the morning of the 14th a passenger train on the Utah Southern extension ran off the track in a cut near California Ranch, Utah, blocking the road all day.

On the 14th a freight train on the Winona & St. Peter road ran off the track near St. Peter, Minn., wrecking several cars.

On the morning of the 16th a freight train on the Minneapolis Eastern road ran off the track in Minneapolis, Minn., and three cars went down a high bank, injuring a trainman fatally.

On the 20th a car of a passenger train on the Athens Branch of the Georgia Railroad ran off the track near Athens, Ga., delaying the train for a time, but doing no serious damage.

On the 22d a passenger train on the New Brunswick Railway ran off the track near Grand Falls, N B., blocking the road all day.

On the 22d a freight train on the Virginia & Truckee road ran off the track near Gold Hill, Nev. The two engines and several cars went down a bank and were badly wrecked, injuring a trainman.

On the morning of the 26th a freight train on the Rumford Falls & Buckfield road ran off the track near Mechanics' Falls, Me. The engine upset and three freight cars were piled on top of it and badly broken.

On the 26th two cars of a freight train on the Portland & Ogdensburg, Vermont Division, were thrown from the track near Cambridge Junction, Vt., and one of them was badly broken.

On the night of the 28th two cars of a coke train on the Pittsburgh & Lake Erie road ran off the track at Struthers Furnace, O., blocking the road some time.

BOILER EXPLOSION.

On the morning of the 26th the locomotive of a freight train on the Pennsylvania & New York road exploded its boiler at Rummerfield, Pa., wrecking the engine. The engineer was thrown 30 feet away and killed, and the fireman very badly scalded.

OTHER ACCIDENTS.

On the afternoon of the 17th a car in a passenger train on the Cairo & Vincennes road caught fire when near Vincennes, Ind., and was destroyed.

On the 21st the engine of a passenger train on the Pennsylvania road broke a parallel rod when near Princeton Junction, N. J., and the broken rod tore out the side of the cab, injuring the engineer.

This is a total of 71 accidents, whereby 11 persons were killed and 45 injured. Ten accidents caused the death of one or more persons each; 18 caused injury but not death, while in 43, or 60.5 per cent. of the whole number, there was no injury to persons serious enough for record.

As compared with April, 1879, there was an increase of 21 accidents, of seven in the number killed, and of 18 in that injured.

It may be of interest to note that 37 accidents are recorded as happening in daylight; 25 at night or during the hours of darkness, and in nine cases the time is not definitely stated. It does not seem that the proportion of accidents at night is any greater than in the day, considering the relative number of trains.

These accidents may be classed as to their nature and causes as follows:

COLLISIONS:	
Rear collisions	15
Butting collisions	8
Crossing collisions	3
	—26
DERAILMENTS:	
Broken rail	2
Broken wheel	1
Broken axle	1
Broken bridge	1
Broken-down car	1
Wash-out	1
Snow	2
Wind	1
Cattle on track	2
Accidental obstruction	5
Misplaced switch	5
Unexplained	20
	—42
Boiler explosion	1
Car burned while running	1
Broken connecting-rod	1
Total	71

Three collisions were caused by trains breaking in two; two by misplaced switches, and one by a car blown out of a siding. The proportion of collisions to the whole number of accidents is 36.6 per cent., or not far from the average of a long series of months.

A rough classification of causes shows 13 accidents traceable to defects or failures of road or equipment; 5 caused directly by the elements or the weather; 6 by accidental obstructions or similar causes that could not well be foreseen or prevented; 27 by carelessness or defects in management, while 20 are unexplained. No malicious accident is recorded. It is very likely that a large proportion of the unexplained derailments are due to poor track.

The only broken bridge recorded gave way because almost entirely burned through; it was a wooden bridge.

A somewhat unusual accident is the burning of a passenger car, which seldom happens. Passenger cars often catch fire, but are quickly put out, as a rule, before much damage is done.

The division, according to classes of trains, is as follows:

Accidents:	Collisions.	Derailments.	Other Accidents.	Total.
To passenger trains	2	20	2	24
To a passenger and a freight	6	..	..	6
To freight trains	18	22	1	41
Total	26	42	3	71
Casualties:				
Killed by	4	6	1	11
Injured by	12	31	2	45
Total	16	37	3	56

Two trains being in each collision, there were therefore 32 passenger and 65 freight trains to which accidents happened during the month.

The month presented a great variety of weather, even for a spring month. Generally favorable and free from storms in the East and South, there was snow as heavy as any of last winter in the far Northwest and on the Pacific Coast. Traffic on most roads was heavy, and probably the number of trains in motion was greater than in the same month for several years past. For a month of generally favorable conditions the number of accidents is large and the record not a good one, especially when we include seven accidents from misplaced switches, and three crossing collisions, sure indications of carelessness or defect in signal equipment.

For the year ending with April the record is as follows:

	Number of accidents.	Killed.	Injured.
May	37	5	20
June	64	18	55
July	81	14	54
August	79	19	59
September	78	8	47
October	104	35	96
November	86	16	64
December	69	18	72
January	62	11	50
February	64	16	49
March	65	9	33
April	71	11	45
Totals	860	180	644
Totals, same months 1878-79	815	208	821

The averages per day were, for the month, 2.37 accidents, 0.37 killed, and 1.50 injured; for the year, 2.35 accidents, 0.49 killed, and 1.74 injured. The average casualties per accident for the month were 0.155 killed and 0.633 injured; for the year they were 0.209 killed and 0.749 injured. The casualties for the month were below the average, though there have been no great accidents this year to swell the number of killed and injured.

Contributions.

The Reading Railroad Suspension.

PHILADELPHIA, May 25, 1880.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It seems idle to say that the suspension of the Philadelphia & Reading Railroad Company, which startled the financial world on Friday last, ruined scores of private individuals and seriously embarassed hundreds of others, besides bringing in its train consequential losses, amounting to millions, had been foreseen; that it had been partly discounted, and that it was not an utter surprise in this city; and yet such is the real truth. For months its paper had been at a discount with the banks, and was not accepted unless accompanied with ample collateral. Its stock was less available than almost any other when brought to the banks by anxious borrowers. In one coal office after another might have been heard the remark, "The Reading was on the street after money again to-day," and a cashier of one of the leading shipping houses threw a bundle of its scrip, which was receivable for coal and all dues to the company, back into the safe with a bitter remark: "Trade dollars are bad enough, but I had rather have them than this stuff!" A leading bank director said to me, more than a month ago, "It is no longer a daily struggle with them—it is now a matter of hours. Day after day their bank account is thousands of dollars overdrawn at noon and not made good until just before the closing hour." A leading railroad director said: "It will be a very serious matter for all of us when they do go under, but they must do so sooner or later, and I can not see how they can ever get over their April payments." Three months ago an analysis of their last reports prepared for a banker was shown to one of the financial officers of another of our largest railroad companies, and he said: "I cannot see any flaw in that argument, nor can I see any way out except through bankruptcy or a composition."

The bank director was right. It was a struggle of hours, and the last hour came on Friday last—a Black Friday for this city. There was only a few thousand dollars to the credit of the Philadelphia & Reading Coal & Iron Company's account with the Farmers' & Mechanic's National Bank, and the first delivery from the other banks brought eighteen checks of the company, mostly for supplies and current expenses, amounting in all to about $350,000—it has been impossible to ascertain just how much. President Gowen was notified, and he was at the bank before the adjournment of the Board of the Farmers' & Mechanics' Bank then in session. He frankly admitted that he could not make the account good and said that he had called a meeting of his board. The checks were returned to the banks from which they came, as required by clearing house rules, and then only was the news known to the Stock Exchange; it is not believed to this day that a thousand shares of stock were sold upon advance information of the failure—a fact that speaks much for the honor of the officers and directors of the company. The stock had opened at 22⅞, rose ¼ on sales of 2,860 shares, and at the first board dropped ⅝, with dealings to the extent of 7,760 shares. Between sessions almost 20,000 shares were sold before it fell below 22, and by that time the first news was rumored, and still so incredulous were the brokers that 10,000 shares more were sold with only a single sale below 18. By that time the board was in session and only a few lots were offered and without material change. But the board continued sitting, and the effect was as if the directors of the Bank of England had sat over their traditional hour of adjournment. Visitors to the office were met with the plain announcement: "The Philadelphia & Reading Railroad Company has suspended payment, being unable to meet its obligations." Tired of waiting holders began throwing over their stock for what they could get, and 16,275 more shares went off, carrying the price down to 15, and it closed with that bid. Half an hour later came the following statement:

"The Philadelphia & Reading Railroad Company and the Philadelphia & Reading Coal & Iron Company have been compelled to suspend payment. The managers will take immediate measures to protect intact the property of both companies and continue their business. For this business the daily revenues will be applied, so far as required, to the payment of wages and supplies. By order of the Board of Managers. FRANKLIN B. GOWEN, President."

There was another rush to sell at any price, and it was offered on the street at 12¾ without takers. The sales of the day were 82,967 recorded. They probably footed up more than that. In New York, where the stock had been listed only a few months and where the sales averaged less than half as much as in this city, the total sales were 40,600 shares, opening at 37½ (that is, percentage of the par value: Philadelphia quotations are for the $50 shares), rising to 38½, and then falling to 30½, with a slight recovery to 32. This is of interest here only as showing how utterly free from any suspicion of stock-gambling the suspension was.

The cause of the suspension was the coal-mining operations of the company begun in 1872 and since carried on upon a scale of vast magnitude and at an expense proportionately great and unremunerative, and it is only fair to say that the reckless financiering of the last ten years has been the rule in the management of the company with the exception of a single decade—the most prosperous in its history. The charter of the Philadelphia & Reading Railroad Company was granted April, 1833. It was to build a railroad between this city and Reading, and it was to have a capital of two millions. Subscriptions were few and work was not begun until 1835. The year thereafter the connection of the McCalmont Brothers with the company began and it has continued ever since. John Gihon & Co., of New York, correspondents of theirs, took the management of its finances and appointed the McCalmont Brothers Financial Agents in London. The first thing done was to create a first mortgage upon the road without authority of law—a lien of a million, of which $816,800 is still outstanding, the rest having been extended with the exception of the small amount of it that was paid off in some way. In 1837 permission was given to extend the road to Port Clinton to compete with the Schuylkill Navigation Company, and the year following a further act was passed giving the right to extend the road to Pottsville, a distance of 95 miles. The restriction upon the capital stock had been removed when the right to build 20 miles further to Port Clinton was granted. In 1839 the road was opened to Reading, having cost $4,540,971, or $78,293 per mile—more than double the figure named in the charter. In 1840 second-mortgage bonds were issued to the amount of two millions, and two years later half a million more. Much of the stock had been sold for whatever it would bring, having been pledged by the company and often sold at a heavy discount. Neither had any of the loans been issued at par but in 1842, the year when the

road was opened, though a general law was passed forbidding the issue of loans below par. The road had then cost $7,119,292 or $74,920 per mile, the discounts on the bonds and the stock and the cost of negotiating them having been included in the cost of the road. In 1843 another two million loan was placed in London. The necessity for drawing thus heavily upon Mr. George McHenry's history of the company will be appreciated by bondholders who may have some interest to know what their rights are. This last loan has never been wholly paid. There was outstanding of it at the end of the fiscal year $1,512,700, of which $981,300 had been extended, arrangements having been made for the extension of the loan at 110. In 1844 the company borrowed a million and a half more, completed the double track, and the cost stood at $9,398,354—almost exactly $100,000 per mile. It is to be remembered that all the money spent had been charged to the cost of the road and apparently nothing to expenses of management. Of this last loan there is now outstanding $800,000, of which $449,000 had not been extended at the time of the last report. The company has never entirely refunded a debt. Its consolidated mortgage was issued for the purpose of refunding these first mortgages, but the temptation of extending them at 110 rather than pay them off by selling consolidated mortgage bonds at 104 or 105 was too great; the latter method would have been the most honest, but it would have deprived them of the $250,000 premium.

By this time the debt was more than three times as much as the stock, and in 1845 the bondholders were appeased by the passage of an act validating their bonds and giving them a vote for every $2,000 of debt. The year after the stockholders were appeased by a stock dividend of 10 per cent., the amount of stock issued, as well as all other items of a like or unlike nature being charged to the "cost" of the road. This stock dividend was illegal, but a compliant legislature validated it at its next session, at the same time restricting future share dividends to the amount of the company's then indebtedness. This was celebrated by another stock dividend of 12 per cent., and the same year still another act was passed for the benefit of the company permitting the creation of preference shares to redeem $3,703,000 bonds due in 1850 and 1856, but the privilege did not seem such a valuable one, as only $1,648,000 was converted. In 1848 it was time to borrow again, and a loan for $300,000 was issued, of which $98,000 is still outstanding, and in 1849 the company borrowed $3,500,000 upon another mortgage loan, this last loan being a little more than 60 per cent. of its share capital, which then stood at $5,593,392. In speaking of any other company it would hardly be necessary to add, as I do in this case, that no dividend was paid in that year, the company being behindhand even in taxes. The next year it was discovered by some bondholder that all these so-called mortgage loans were illegal, and the Legislature was again called upon. It responded promptly with an act validating all these loans, but with the addition of a proviso making the stockholders personally responsible for all debts thereafter contracted, except as far as related to new bonds exchanged for former issues. This is a feature of responsibility which, so far as railroad lawyers know, affects no other American railroad. Nevertheless the directors were so well pleased that they promptly declared a cash dividend of 6 per cent. in that year, although they had borrowed ten times as much the year before. I have forgotten to say that of this last issue there appears to be only $67,000 outstanding now. Of this, $44,000 was unextended at the time of the last report. During the next five years the "cost" of the road continued to increase, but in 1852 8 per cent. in stock and 6 per cent. in cash were paid; in 1853, 3 per cent. cash; in 1854, 10 per cent. in stock; in 1855, 4 per cent. in stock and 8 per cent. in cash; in 1856, 8 per cent. in cash, and in 1857, 4 per cent. in cash.

In all this time the Legislature appears to have been permitted to meet and adjourn without legislating upon the finances of the Reading Railroad Company, but the time was coming. A third mortgage for seven millions—twice as much as the last and with an addition of only three miles bought for $100,000—was then created; but it was a bad year and bondholders begun to think that the Legislature might weary of validating Reading Railroad loans, and the bonds could not be sold. There was another resource, however: an act was obtained permitting a consolidation with the Lebanon Valley Railroad, which had cost $4,495,076, or $83,162 a mile. By this time the "cost" of the Reading had increased to $196,558 a mile and dividends stopped. The year after another "validating" Act was passed and the company then succeeded in getting rid of a little more than half of its seven million "mortgage loan." Of this I find only $79,000 still outstanding. No dividends were paid in the two following years, and it is clear that none could ever have been paid if commissions and discounts had been charged to revenue instead of capital. Here ended the English management of the company, with its credit so far gone and its debts so pressing that then nothing could have saved it from bankruptcy except the war, which had broken out a few months before Mr. Charles E. Smith assumed the presidency on July 15, 1861.

From this time dates a new era in the company's affairs—an era of honesty during which the "pay as you go" policy was for the first time introduced into the management. The gross earnings which in 1855 had been $4,321,794, had fallen in that year to $2,905,838. The stock stood at 15, its par value being 50. In the following year $555,049 was written off for depreciation of assets, and that item for the first time appeared upon the books of the company. From this time as long as Mr. Smith retained the presidency, he took advantage of the enormous profits of war times to reduce the debt, and charge everything to revenue that belonged on that page of the ledger. In 1863, no dividends having yet been paid, he charged off $1,066,775 to cost of new works, $1,756,850 for a 14 per cent. dividend, and reduced the debt $2,228,484; the shares rose to 64 and the debt was above par. The year after 15 per cent. was paid in dividends and the debt reduced $3,395,449. This not only exhausted the power of the company to pay dividends, but brought the bonds up to a high premium. The dividend of 1865 was made payable in cash or stock, and the company began spending its surplus in buying up the stocks and bonds of its absorbed companies. This ended the war period, and with it the remarkable earnings of the company. Nevertheless, in 1866, 10 per cent. dividends were declared payable either in stock or cash, $1,169,234 charged off to new works and $992,008 invested. In 1867 the dividend was the same, the amount charged to the new works $336,520, and the sum invested $300,100. The year after, 1868, the dividend was the same, but it required almost a million more than the net surplus to pay it in cash. In 1868 the Trevorton road was bought, 15 miles long, for $400,000 in debentures payable in 1893, and put in order at a cost of $27,512, after which it was extended to Shamokin. A few months later the Little Schuylkill was bought, the company guaranteeing 7 per cent. upon its bonds for $723,500, due in 1882, and 7 per cent. per annum for 93 years on its capital stock of $2,646,100. In 1869 Mr. Smith went to Europe and Mr. Gowen was appointed President *pro tem*. The last important act of his administration was to instruct Mr. Gowen, then the Counsel of the company—a position which he has occupied ever since at a salary of $10,000 a year—to oppose an act before the Legislature "to authorize railroad and canal companies to aid in the development of the coal, iron, lumber and other material interests of the commonwealth." The result of this opposition was the amendment of the act so as to except Schuylkill County from its application. The dividend was 10 per cent., which was a trifle less than the amount of the expenses and fixed charges. His ten years' work may be summed up briefly, as far as the standing of the company goes, in a statement that its mileage, equipment and property had increased from 50 to 100 per cent., its business had trebled and its debt had been reduced five millions, or 40 per cent.. while its reserve fund and its assets in the shape of stocks and bonds had increased about five millions.

With the accession of Mr. Gowen to the presidency begins the history of the company as a coal-mining as well as a coal-carrying company. He was chosen as Mr. Smith's substitute, and late in 1870 was elected President to succeed him. In his very first annual report as President he says that the strikes in the region and the fluctuations in the company's tonnage directed the attention of its managers to the necessity of securing control over the production of coal, and that the result "of this action has been to secure and attach to the company's railroad a body of coal land capable of supplying all the coal tonnage that can probably be transported over the road for centuries." Had it not been for the action of Mr. Gowen under President Smith's direction less than two years before, there would have been no necessity for a special charter; but Schuylkill County having been excepted from the provisions of the act, a charter was obtained for the Laurel Run Improvement Company. Mr. McHenry charges that the prime object of this charter was not to do the company any good, but to enable the proprietors of the Trevorton coal lands and those formerly owned by the Little Schuylkill to sell them to the railroad company at their own price. For this there is only Mr. McHenry's assertion. The facts are that a charter was obtained for the Laurel Run Improvement Company in which other names were used as a cloak and which contained a clause "That it shall be lawful for any railroad or mining company existing under the laws of this state to subscribe for or purchase the stock, or to purchase and guarantee the bonds of the company hereby incorporated." Without any meeting of the stockholders the railroad company promptly subscribed for the entire capital stock of the company, which now stands at eight millions, changed its name to the Philadelphia & Reading Coal & Iron Company, and at once began the purchase of the lands "capable of supplying all the coal tonnage that can probably be carried over the road for centuries." This was in 1871, when coal lands had fallen in price, but the Trevorton property was bought at the original cost in 1868 with 6 per cent. compound interest, taxes and all expenses added. The Little Schuylkill lands cost $923,500 originally and $400,000 had been spent on them. They passed to the Coal & Iron Company for $2,250,000—a profit to the first purchasers of $925,000.

The era of expansion had now fairly set in. On Jan. 1, 1870, the Schuylkill Navigation Company was leased for 999 years for $658,000 per annum—an amount which meets the interest upon the bonds and pays 70 cents a share on the common stock and $1.40 on the preferred. This has always been a losing lease. Last year the deficit was $300,080. In that year the profits were $3,719,564; dividends at the rate of 10 per cent., $3,292,368; increase in the debt, $6,022,285. Feb. 18, 1871, an act was got from the Legislature authorizing the merger with several branch roads and the issuing of such bonds as the company may deem advisable to make. On June 1, a consolidated mortgage—all the previous mortgages, with one or two exceptions, had been "mortgage loans"—was issued to the amount of $25,000,000. Of this amount, $7,968,000 bears 6 per cent. interest in gold and $10,649,000 bears 7 per cent. interest in currency. Upon this loan, $464,970 interest is due on the 1st of June, but no default is expected upon this. Of this loan, $11,692,000 was placed in this city and in London in 1871, and with this very handsome amount the Reading stepped into the real estate market. The natural result followed. Prices were raised to meet the views of the purchaser, and collieries and coal lands were bought at extravagant prices. For lands that could have been purchased at $800,000, the company paid half a million more, and the Manhattan Company sold for two millions and a half what it had offered for almost a million less.

To meet the interest account which was growing with mushroom rapidity and titanic strength, a new system of book-keeping was introduced, or rather a curious fiction was indulged in. The Coal & Iron Company was regarded as an independent solvent corporation, instead of a parasite, that was sucking all the profits of the company, and more too. The company took its earnings, paid its running expenses; charged up to the Coal & Iron Company its constantly increasing deficit, and then borrowed money to pay its stockholders dividends, which it had already spent in paying the interest on the bonds of its *alter ego*—the Coal & Iron Company. This was first done in 1871, when the company had profits amounting to $3,998,272. Ten per cent. was divided, and $861,063 advanced to the Coal & Iron Company, and charged against it. The increase in the debt was $11,954,007. In 1872, the Susquehanna & Tidewater Canal was leased—another serious incumbrance that cost last year $175,381—the Mount Carbon Branch was merged and the Schuylkill & Susquehanna branches were merged and the Catawissa Railroad was leased. The Susquehanna Canal is leased and operated for the interest on its bonded debt of $1,898,310, and half the net earnings. The loss to the Reading on this last year was $175,381. Catawissa was leased at an annual rental of 30 per cent. of the gross receipts, the Reading assuming the interest on its funded debt of $1,802,350. The lease is a losing one, but its accounts are not kept separately, so it can not be said how much the deficit is. The only legislation of the year was an act authorizing the company to increase its capital 50 per cent., and to endorse the bonds of any manufacturing or mining company doing business along its road. In this year for the first time began the system of juggling the accounts of the two companies, by which the Philadelphia & Reading Coal & Iron Company did everything possible to make a good showing for the railroad company which closed its fiscal year November 30, and then repaid back the loan, loaned the money back again to the Coal & Iron Company, whose year coincided with the calendar year. The company showed a profit of $2,964,440, against which ought to have been charged the deficit of the Coal & Iron Company and interest on branch roads, $2,426,889, which would have reduced the net profits to $537,551. Instead of this, $3,593,391 was divided at the rate of 10 per cent., the money borrowed to pay it and the amount charged to the Coal & Iron Company—one pocket borrowing from another in which there was not a sou. The increase in the debt in this year was $7,344,120.

The banner year for debt creation was yet to come. In 1873 almost all the rest of the consolidated bonds were put out, a subscription was opened for an unsecured debenture loan, and a ten million improvement loan was brought out in London. The cost of the coal land by this time had reached $26,366,116, the coal combination had gone into effect, and from being a carrier of coal the Reading Company had become an owner of coal lands, then a miner of coal, and last of all a wholesaler and retailer. During the previous year special mortgages had been placed upon the coal lands to the amount of $11,131,000. During 1873 this amount had been increased to $13,437,500, the debt had swollen $11,105,911, and the deficiency of the Coal & Iron Company, branch roads and telegraph lines had risen to $3,548,490—$582,252 less than the profits. And yet 10 per cent. dividends were paid as usual, calling for $3,598,384. In 1874 came the general mortgage for sixty millions, of which ten millions were placed in London, and the Coal & Iron Company made a mortgage in favor of the consolidated mortgage. The deficiency of the Coal and Iron Company and branch roads in this year amounted to $3,905,943, leaving the actual profit at $39,430. The usual 10 per cent. dividend was paid, amounting to $3,701,602, and the company went $13,968,422 deeper in debt.

By this time the company was almost at the end of its string. The actual profit of 1874 had been less than $40,000. In 1875 the deficiency of the Coal & Iron Company and the branch lines had risen to $4,059,142, and the surplus had fallen to $2,864,938, so that there was an actual deficit of $2,094,105. The reported increase in the debt was $2,053,124. It was actually much greater, but not apparently so, for the company, instead of being able to borrow whenever it wanted, was in disgrace and had to put up collateral like any other needy borrower. This it had done in the shape of unsold general mortgage bonds. On the 29th of December, 1875, the company declared its last quarterly dividend of 2½ per cent., although it had not been able to borrow the money to pay its October interest until after bank hours on the 20th of September. It was offered if Mr. Borie would procure a statement that the company had earned either of its two previous dividends. And when asking one of its officers for the statement, Mr. Borie declared with emphasis: "Reading shall pay 10 per cent. dividend just as long as she can borrow the money to do it with." This was the last dividend ever paid, and the last for which the stockholders can hope for many a day. Mr. Smith's discovery that there was a large floating debt about which nothing had been said, and which did not appear upon the books, led to his resignation and the publication of the first balance-sheet of the Coal and Iron Company in the report for 1876. With the publication of the balance-sheet the transfer of credits from one company to the other had to cease, and with gross earnings of $12,227,571, or only $430,000 less than the year before, the an-

nual report admitted a deficiency of $1,361,957, in addition to $1,447,934 lost by the Coal & Iron Company, to say nothing of interest upon the investment of the railroad company. The year before the report had claimed a profit of $2,064,938 when the actual deficit had been even greater. A summary of the war period has been given. The period of the Coal & Iron Company development shows, according to the books of the company, over the signatures of its officers, real earnings for both companies from 1871 to 1876 of $2,050,635, while the dividends paid during that time were $10,040,264. The net loss upon the operations of the Coal & Iron Company with its investment of over sixty millions during that time was $297,443, exclusive of interest. The debt had much more than doubled and the interest account was running ahead of the net earnings.

During the last four years President Gowen has met with his stockholders every year with a deficit varying from half a million to two millions, and each year he has cheered them with the hope that next year he would be all right. Last year he leased the North Pennsylvania and the Delaware & Bound Brook, with what results we can only learn from hearsay. He gave out no report last year for either. What the future of Reading will be we can tell much better when we have a balance sheet of Mr. Lewis' preparation rather than of Mr. Gowen's approval. R. W. M.

Location of the Southern Pacific through Tehachapi Pass.

SAN FRANCISCO, Cal., May 6, 1880.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with much interest in former numbers of the *Railroad Gazette* descriptions of difficult railway location in South America and elsewhere, and, although more accustomed myself to bearing the transit and the level than telling of their work, to having my coat worn through at the shoulder than at the sleeve, still, relying largely upon the unusual interest of the location in itself, I will attempt a brief description of the crossing of the mountain range in Southern California by the Southern Pacific Railroad at the point known as the Tehachapi Pass, and to aid in the description, have made reduced copies of the location at two particularly interesting points in the ascent from Caliente to the summit, which I have been enabled to do through the courtesy of Col. Geo. E. Gray, its Chief Engineer, to whom and to Mr. M. Deering, Chief Draughtsman, I would return my thanks for their attention. The interest from an engineering standpoint begins near Caliente, where the mountains have closed in upon either side in contrast to the broad valley which has been left behind, and seems to forbid further progress for the iron way. The valley of the Agua Caliente Creek is followed as far as Caliente Station, when the level, which had gone ahead, showed that in order to overcome the elavation of the Tehachapi Pass at the summit and still not exceed the maximum grade, which was limited to 116 ft. to the mile, the valley of the Tehachapi Creek, which flows into the Agua Caliente at this point, could not be closely followed, but that more distance must be obtained, which is accomplished by turning the line back upon itself and running along the opposite bank of the Agua Caliente for a mile or more and then following up the tributary creeks, the line taking to the mountain sides; and in fitting the track to the projecting spurs and the deep cañons, still keeping steadily rising, the peculiar alignment shown in cut No. 1, is developed, when it will be seen curves of 573 ft radius are freely made use of notwithstanding which sharpness of curvature, frequent tunnels through the spurs become necessary, which are followed by deep fills across the gorges.

From the crossing of Tehachapi Creek, marked *A*, the mountain grade commences, and the locomotive, after urging its way through more than six miles of its devious

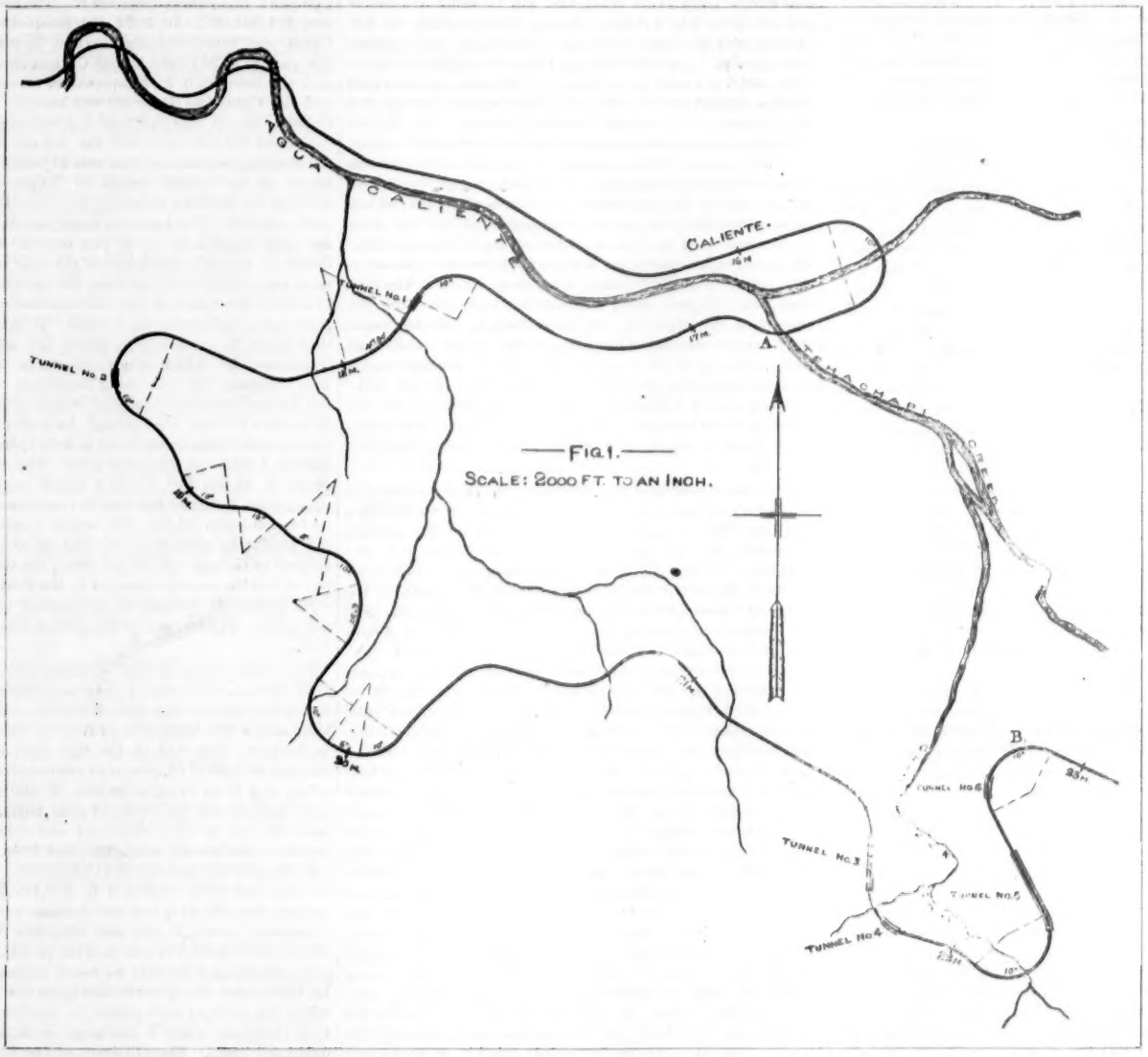


FIG. 1.
SCALE: 2000 FT. TO AN INCH.

road, reaches the point marked *B*, where one can look down upon the track recently passed over above Caliente, which is 660 feet lower in elevation and less than a mile and a quarter distant in a direct line. The engine, still puffing away up the incline, rising two feet with every hundred it advances, has lifted itself far above the creek, which can be seen deep down in the valley upon our left, while upon our right the tops of the hills are seen with difficulty, half way up whose sides the gash for the railroad has been hewn. The scenery here is very grand, and the ride quite exciting.

Some nine miles farther on the grade of the valley approaches to that of the railroad again, and rises somewhat abruptly ahead of us, and a second development to gain distance becomes necessary, in accomplishing which the novel alignment known as "The Loop" (see fig. 2) was devised, made possible by the broken topography of the country at this point, by which sufficient height is gained to enable the line to follow the depression to the summit. This "Loop" is formed by first tunneling through a small hill, then winding spirally around a larger hill adjacent, using 10° and 8° curves, and finally across the top of the first hill over the tunnel, and over other small hillocks, thence up the cañon to the summit. The length of the loop is 3,800 ft., and the difference in elevation of its two ends is 78 ft. This novelty in railroad location is accomplished without excessive excavation or embankment, which shows much skill in fitting the line to the broken hills, and is the only instance in the country, I think, where a railroad crosses itself in this manner, although something similar is given in Prof. Vose's "Manual" of a proposed location in Pennsylvania, which, I believe, has never been built.

The conception and execution of the foregoing are due to Col. Geo. E. Gray, Chief Engineer, and his able Chief Assistant Engineer, Mr. W. Hood, under whom this Southern Pacific Railroad is now being rapidly pushed across the continent, through Arizona, New Mexico and Texas, to its objective point, the Gulf of Mexico; and a second overland line to the Pacific is a thing of the near future, which will pass through the heart of the new and promising mining regions of the territories, through the fertile valleys of Southern California, with their extensive vineyards and orange orchards, and which, with its many attractive features, must command a large and profitable traffic. G. F. P. DAY.

German Experience with Preserved Railroad Ties.

[Translated for the *Railroad Gazette* from an article in the *Organ für die Fortschritte des Eisenbahnwesens* by Privy Councillor Funk, of the Cologne & Minden Railroad.]

With the increase in the employment of iron as a material for the superstructure of of the railroad in modern times, it might appear that any discussion as to the durability of wooden railroad ties and methods of increasing it had lost much of its interest. But when we come to consider that, even where the results of experiments with the iron superstructure have been most successful, the roads will still be constrained to employ wooden ties yet for a long series of years; that more than half of the sixty millions wooden railroad ties that have been laid on the railroads of Germany and Austro-Hungary have been subjected to no treatment to prolong their life; and that millions of these rapidly deteriorating ties are annually replaced by others equally devoid of any means of preservation, while at the same time positive practical experience among the members of the German Railroad Union, extending over a period of thirty years, shows that several millions may be annually saved in the renewals of ties alone, we should have sufficient excuse for the occupation of valuable space in such a discussion. To these reasons must be added the urgent necessity existing in modern times for the utmost economy in railroad matters, and that those roads doing the least business will be most benefited by it, as in their cases, the destruction of ties is caused by rotting more than mechanical wear. I am still further impressed with the utility of this subject by the results of my thirty-six years' experience in the construction and maintenance of the Royal Hanoverian and the Cologne & Minden railroads. On both of those roads the importance of finding some method of prolonging the life of ties has been fully recognized, and since 1847 on one and 1849 on the other road, for periods of thirty-two and thirty years respectively, such methods of adding to the durability of the ties have been extensively employed. Then again, at the technical conventions of the Railroad Union, held in 1865 in Dresden and in 1878 in Stuttgart, where this was one of the questions submitted for discussion, I was appointed reporter, and for the last few years I have had frequent inquiries from different parties respecting my experience in this matter on the Hanoverian and the Cologne & Minden railroads, with a view to the introduction on other roads of the methods of impregnation practiced here.

We cannot be expected to take into consideration here, or even express an opinion on, the many different propositions and experiments that have been made with a view to increasing the durability of wood; we shall confine ourselves rather to a discussion of such as have been most successful. But in order to comprehend and obtain a correct view of

them, it is necessary to precede their description with a few general remarks.

I.—GENERAL.

Wood, as is probably known to our readers, is made up of the woody fibres proper (cellulose) and the juices or sap that fills the interstices between them. The first are almost alike in composition in all woods, the chemical constituents being carbon 52.4 per cent., oxygen 41.9 per cent., hydrogen 5.7 per cent.; the sap differs in each kind of wood The sap of oak is particularly rich in tannin, that of beech in vegetable albumen, and that of the different species of pine in resin. In all of them we find, in addition to the above, gum, vegetable glue, gallic acid, sugar, etc., in solution.

The pure wood-fibre is not particularly liable to decomposition; it is generally caused by the sap. This substance shows, like all organic bodies, a strong tendency to decompose; *i. e.*, to resolve itself into such combinations as are less liable to attack by putrefaction.

This latter stage is the result of putrefactive fermentation, induced by the oxygen of the atmosphere, and, when the sap is in this condition, the wood-fibres are affected by it.

The sap of felled wood goes over into putrefactive fermentation only under the following conditions:

1. When the access of air is permitted.
2. When the wood is in a damp state.
3. Under the influence of a moderate temperature, ranging say from 32° to 122° F.

If both air and oxygen are excluded from the wood, putrefactive fermentation cannot set in, and on this principle is founded the preservation of food in air-tight cans, and the almost endless durability of wood under water. The fact of moisture being requisite to a state of putrefaction is proved by the preservation of many substances by drying and kilning, and the great durability of the thoroughly dried wood in old buildings that are protected from any moisture. In the same manner we prove that warmth is necessary to putrefaction, by the discovery in the Siberian ice-fields of perfectly preserved mammoths, while, on the other hand, we know that at a temperature above 122° we commence the kiln-drying process.

We may therefore conclude that on the putrefactive fermentation of the sap, consequent on the presence of these three factors, depends the rotting of the wood, and the means of increasing its durability are consequently directed chiefly toward their frustration.

II. METHODS OF INCREASING THE DURABILITY OF WOOD AS NOW PRACTICED.

Firstly. The sap must, as far as possible, be removed from the wood, and this expulsion, or rather diminution, of sap present, is effected either—

a. By felling in winter time, when there is least sap in the trees.

b. By girding and barking the standing trees as practiced in some districts.

c. By drying in the open air or in heated rooms.

d. By extraction by means of water.

e. By steaming in a closed vessel.

Secondly. Such sap as may be left in the wood must be protected from putrefaction by preventing an occurrence of the conditions we have described above. This may be effected by—

a. Exclusion of air and moisture by painting with oil, tar, etc., or by nailing tin or felt paper over every part where the cross grain is exposed.

b. Removal of the moisture from wood by charring, which at the same time coagulates the albuminoids in the wood and forms a charred outer surface, through which substances favorable to putrefaction from the outside find great difficulty in penetrating.

c. Through the infiltration into the wood of, or its impregnation with, antiseptic fluids, by means of which putrefactive fermentation will be prevented, no matter how favorable to such a process the condition of the wood may be.

III.—MODERN METHODS OF PRESERVING WOOD.

The latest methods of wood-preserving are founded on infiltration or impregnation by antiseptics, and among those best known we reckon, 1, salts, green vitriol (sulphate of iron), blue vitriol (sulphate of copper), corrosive sublimate (bi-chloride of mercury), chloride of zinc, common salt (chloride of sodium), and potash (carbonate of potassa); in addition to these we find used certain volatile oils, resins, aromatic substances, tannic acid, and lastly, the product of the dry distillation of vegetable substances, containing principally pyroligneous acid and creosote.

The actual effects of these different substances are still comparatively unknown. Some are supposed by coagulating the albumen to secure it against putrefaction, others combine with the vegetable glue and form insoluble compounds incapable of fermentation, while others appear to prevent putrefactive fermentation by their simple presence.

Of the many different experiments that have been made with the substances just mentioned, either separate or combined, with a view to increasing the durability of wood, after long years of experience, only four have acquired any practical importance. These are the impregnation of wood with—

1. Sulphate of copper (blue vitriol).
2. Corrosive sublimate.
3. Chloride of zinc.
4. Creosote.

Experiments with the other methods have been quite abandoned, partly because the results were not satisfactory, and partly because the same effects were obtainable at less expense. The Boucherie process, so much used in France, which consisted of infiltration of the antiseptic fluid, generally sulphate of copper, into the wood of the tree while standing, thus forcing out the sap, has found few friends in Germany and Austria, and is now entirely abandoned there. The process was rendered still more difficult by the fact of its being only applicable at a certain time and in a particular place, it was expensive and the results not so favorable as with impregnation.

The system of soaking the wood in a warm or cold antiseptic solution, or even boiling therein, has in like manner proved unsatisfactory compared with impregnation, because the solution cannot permeate the wood thoroughly.

We may refer also to the process of steeping in corrosive sublimate solution as practiced almost exclusively in England from 1838 until lately. It is now almost entirely given up, nor has it been widely adopted on the continent although effective, for the reason, that not only is it a very costly process, but it is likewise very injurious to the health of those who have to conduct it.

The impregnation of wood with the three above-mentioned and most used substances, sulphate of copper, chloride of zinc and creosote, is now accomplished universally in a closed tank under a powerful pressure of from 7 to 10 atmospheres, which ensures the greatest possible penetration of the antiseptic fluid into the pores of the wood. To aid and facilitate this penetration, and also to reduce the sap as much as possible, the wood is either previously highly dried, in creosoting, or thoroughly steamed in the impregnating tank where chloride of zinc or sulphate of copper is employed. In the latter case, the air is pumped out of the tank as far as is possible and the dissolved sap is thereby drawn out from the wood, to be drawn off by a proper discharge-tap. If the impregnating fluid is then allowed to run into the tank, it penetrates very readily, and under a powerful pressure kept up for several hours will permeate the wood from end to end.*

Just as the process of infiltration with antiseptics was first invented and practiced by a Frenchman, Boucherie, so it was later with the process of impregnation, which was discovered by Breant in 1831 and patented by him in 1838, but he forced the solution into the wood by simple atmospheric pressure instead of putting on a direct mechanical pressure as now practiced.

The Englishmen, Bethell and Payen, secured a patent in 1840 on the process of impregnating wood with oil of tar and other bituminous substances containing creosote, by the application of a powerful pressure directly upon the impregnating fluid, after the wood has been, as far as possible, freed from air. The Bethell process of creosoting consists, consequently, of the follow ing operations:

1. Thorough drying or steaming.
2. Removal of the air from the wood by the exhaustion of the impregnating tank.
3. Heating the liquid to a temperature 100° to 125° F. before admitting it to the tank, in order to render it sufficiently fluid.
4. Admitting the fluid and driving it into the wood by a pressure of from seven to ten atmospheres, maintained for six or seven hours.

Impregnation with chloride of zinc was first proposed in 1838 by W. Burnett, in England, and there patented by him. At first, the process was confined to a simple steeping in the solution for twenty-one days, but this was ultimately abandoned for impregnation under pressure in a closed tank. The process met with little favor at first, bett r results being attributed to the use of sulphate of copper (blue vitriol). As soon, however, as it came to be considered that while the use of blue vitriol required costly copper tanks, iron would do for the chloride, and that in addition the latter was by far the cheaper of the two, it gradually grew into popularity. From England, the process was carried to Bremen by the ship-builder Wendt, in 1846, and at first the telegraph posts of the line between Bremen and Bremerhafen were treated with the chloride. In 1847, as a further experiment, some 6,000 ties of the Hanover & Bremen Railroad, and soon afterward, the timbers of the bridge over the Elbe at Wittenberg were subjected to the process.

Since 1851, chloride of zinc has been used exclusively on the Hanoverian railroads, and from a little later date on the Brunswick lines, and so it gradually spread over Germany, until at the present time in Austria and Germany it is employed by twenty different railroad managements.

The process consists in the following operations:

1. Steaming the ties from one to three hours, at a steam pressure of three to four atmospheres, for the extraction of the sap, assisted by running off the extracted sap and condensed steam at intervals of thirty minutes.
2. The air in the tank is gradually exhausted during one to three hours, until a vacuum of 20 to 24 inches mercurial column has been obtained, this to ensure a more complete extraction of the sap from the wood and a more thorough penetration of the impregnating fluid.
3. Admission of the impregnating fluid into the tank and absorption by and forcing into the wood at a pressure of seven to ten atmospheres, maintained for three to four hours.

The impregnating fluid consists of chloride of zinc (metallic zinc dissolved in muriatic acid), containing from 28 to 30 per cent. of zinc (specific gravity 1.80 to 1.85), and diluted with thirty to sixty parts by volume of water to one of chloride of zinc. This dilution, 60 volumes of water, is recommended by Burnett, and experiments have proved that greater success attends the use of weak solutions than where the stronger are used. In Germany the chloride is generally dissolved in fifty times its volume of water.

Blue vitriol (sulphate of copper) is still used to a considerable extent in Germany for the impregnation of ties. In most cases this is not effected under pressure after a previous steaming and extraction of the sap from the wood, but only by steeping the ties or boiling them in the impregnating fluid. This may account for the very various, and in part, very unfavorable, opinions expressed respecting impregnation with blue vitriol, which must be attributed more to the methods of impregnation than to the substance employed.

IV.—COST OF IMPREGNATION.

In considering the question, whether it is more advantageous to impregnate the ties before using them, or to use them in an unprepared condition, the cost of impregnation is of decisive importance, as the increase of durability attained by impregnation must bear proper proportion to the increased cost of the ties that have been subjected to this process. The expenses attached to impregnation must include, not only the cost of materials and labor, but the interest payable and the addition to the sinking fund necessitated by the cost of erecting the impregnating works, and also the extra expense of transportation. There is no doubt that the outlay attached to the establishment of works for impregnating under pressure has frequently prevented railroad administrations from using this process.

Materials.—The materials employed vary considerably in price, and their cost depends also, to a greater extent, on the amount of water that is used in making the solution of mineral salt. Chloride of zinc containing 28 per cent. of the metal costs from $1.55 to $2.21 per 100 lbs. The degree of dilution recommended by Burnett is one part by volume of the chloride to sixty parts of water. This, or a similar proportion, appears to be more commendable than the strong solution of one in thirty in use on some lines—the Brunswick Grand Ducal Railroad, for instance. When we impregnate under a pressure of seven to eight atmospheres, we find that oak ties containing 3.5 cubic feet of wood absorb an average of 0.35 cubic feet; beech ties of like size, 0.68 cubic feet; and pine ties, 0.70 cubic feet of the impregnating fluid.

Blue vitriol costs $7.70 to $10 per 100 lbs., and like the chloride, is used in solutions of varied strength, but in the most cases with sixty parts by weight of water. The quantity absorbed would, with suitable wood and an equal pressure, be about the same as is given for chloride of zinc; but we must take into account that many roads using the blue vitriol only steep or boil their ties; the remainder employ almost exclusively a low pressure of 1½ atmospheres, equal to that naturally exercised by a column of water 39 to 40 feet in height.

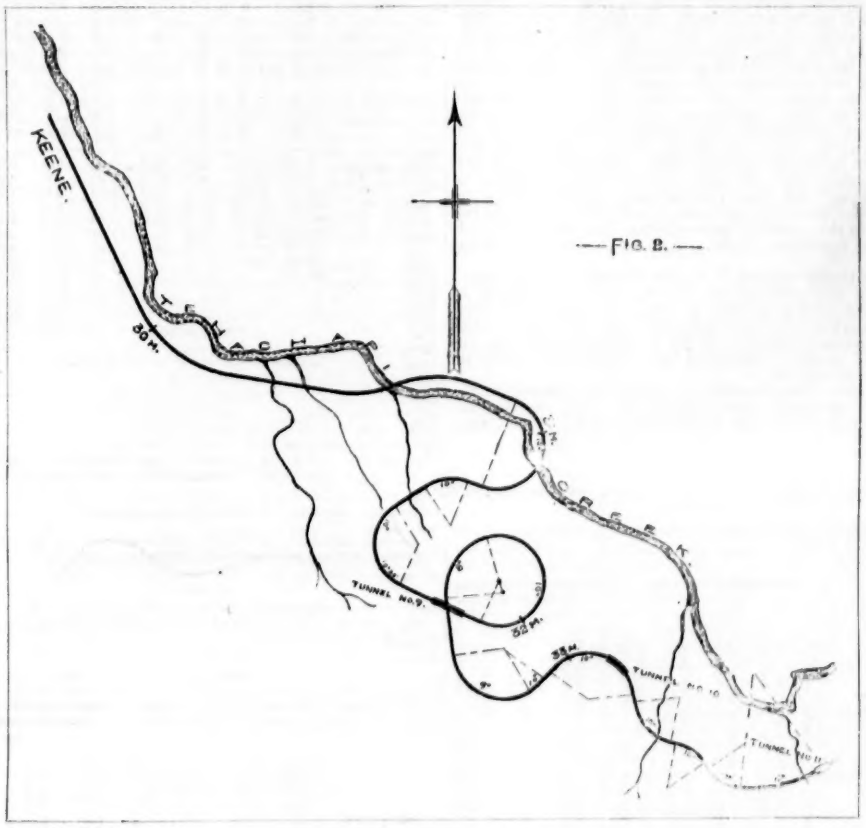
Creosote obtained from Bethell, of London, costs $1.55 to $1.77; that manufactured in Germany by Bronner, of Frankfort-on-the-Main, $1.09 to $1.32 per 100 lbs. This creosote consists chiefly of coal-gas tar, which is distilled a second time, to render it more fluid under the influence of heat, by removing all the small coaly particles. Bethell's preparation is supposed to contain from one to two per cent. of creosote, but careful analyses showed that for the most part it contained no trace of that substance, and Bethell explained later that its presence was not essential to success.

The process still retains the name of creosoting, although of late the high-priced material imported from England has not been used.

With the cost of material must be reckoned the outlay for coal, oil, red lead, etc., used for the engines and boilers employed in impregnating, the prices of which are well known. The proportion per tie will depend on whether the engine serves one or more impregnating tanks.

The cost of labor is made up chiefly of the expense of handling the ties at the tanks, and running the engine. The outlay for this purpose will depend on the perfection of the labor-saving contrivances. The most economical arrangements as yet devised is that in which the ties are loaded cylindrically on iron cars that can be run into the tank and out again on a track. This is effected by having one end of the tank removable and fastened by screw-bolts. The expense of interest and sinking funds for the capital invested depends on the amount of such capital required and also on the number of ties that require impregnating. The more rapidly the process of impregnation is carried on, and the greater the number of ties to be impregnated, the less will be the proportion of expense to each tie.

The total cost of establishing an old-fashioned impregnating establishment for chloride of zinc on the Hanoverian railroads, with two impregnating tanks of 32 ft. 8 in. in length and nearly 6 ft. diameter, constructed to stand a



— FIG. 2. —

* Dr. Wöhler, of Göttingen, undertook the analysis of some oak ties that had been impregnated with chloride of zinc on the Hanoverian railroads under a pressure of eight atmospheres. In the innermost layer of the wood, he found the chloride. This proves, that if the solution had reached the innermost portion of the timber by simple impregnation, the saturation would have been still more complete had the process been preceded by steaming.

pressure of eight atmospheres, with the building, steam engine, air and force-pumps, reservoirs and cars to run into the tanks, but without the site or side-tracks, was about $8,000. An earlier constructed apparatus at the Minden station, built for creosoting but now used for chloride of zinc, cost $19,600. It has been in constant use since 1849 without requiring any considerable repairs, and in 1874 was removed to the neighboring depot of Porta, on the Weser. The impregnating apparatus at Brunswick, with two tanks, cost $13,500.

In the facts above presented we have an explanation of the wide difference in the cost of impregnating railroad ties according to the different systems. This cost averages, according to figures furnished by the German and Austrian railroad administrations, for each tie, as follows:

METHOD OF IMPREGNATION.	OAK.		BEECH.		FIR.	
	Fr'm	To	F'm	To	F'm	To
	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
1. Chloride of zinc	5.80	13.6	11.9	19.2	7.7	12.4
2. Blue vitriol	8.7	18.2	21.8	24.3	14.5	20.6
3. Corrosive sublimate (not under pressure)	20.1	24.3	....	....	24.3	38.8
4. Creosote (under pressure)	21.4	32.8	....	43.2	35.5	55.9

Impregnation with chloride of zinc is therefore by far the cheapest process, costing only one-half to one-fourth as much as creosoting, its most successful competitor.

V. RESULTS OF IMPREGNATION.

The most interesting and important question with regard to the impregnation of ties concerns the results.

In consequence of the utter want of experience, definite information on the subject could only be obtained by careful observation and record. This was rendered extremely difficult by the many different factors derived from the nature of the wood, and the circumstances in which it was used, that had to be taken into consideration. Whether the timber was grown on light or heavy soil, whether the ties were laid in clean and porous, or in clayey and impermeable ballast; whether the upper surface is exposed to sun and air, or whether it is covered with ballast; whether the ties were first dried, or whether they were impregnated in a green condition, etc., all must exercise great influence on our question. All these circumstances received, when the observations were first undertaken, very little notice, as experience in the results of impregnation was entirely absent, and it was therefore necessary to direct particular attention to them.

The statistics contained in the reports of the transactions of the technical conventions of the German Railroad Union, held in Dresden in 1865, in Munich in 1868, in Dusseldorf in 1874, and in Stuttgart in 1878, are unfortunately not so complete as might be wished, although the Dusseldorf meeting considered them sufficient to justify the following deductions:

"By means of impregnation a longer life is secured to the ties. The substances best adapted for this purpose are chloride of zinc and such as contain creosote. Blue vitriol

TABLE A.

Comparative Durability of Unimpregnated and Impregnated Oak Ties.

The number of ties changed, expressed in percentage of the original laid, was:

FROM THE FIRST YEAR TO THE	UNIMPREGNATED TIES.					IMPREGNATED UNDER PRESSURE WITH—		
	Emperor Ferdinand Northern R. R., 615,968 ties	Hanover R. R., 565,261 ties laid in 1845-47	Cologne-Minden R. R., 140,108 ties, laid in 1846-48.	Berlin-Potsdam, 180,204 ties, laid in 1849	Altona-Kiel R. R., 107,000 ties, laid 1843-44	Chloride of zinc—Hanover R. R., 108,690 ties, laid in 1854	Creosote—Cologne-Minden R. R., 67,678 ties, laid in 1854	Chloride of zinc—Rheine-Emden R. R., 18,600 ties* laid in 1854-55
5th inclusive	0.54	0.61	0.29	....	0.06	0.15	0.05	.....
6th "	1.25	1.14	1.88	0.34	0·19	0.20	0.30	.....
7th "	3.95	3.88	6.11	1.81	0.33	0.37	0.32	.....
8th "	8.93	6.04	11.27	3.46	1.13	0.52	0.53	.....
9th "	18.74	10.48	16.36	5.35	3.84	1.18	0.53	.....
10th "	25.70	14.92	20.29	8.12	6.71	2.20	0.78	1.0
11th "	41.46	19.92	28.34	11.49	10.38	4.38	0.81	.....
12th "	74.73	26.09	38.97	15.63	16.64	8.02	1.02	.....
13th "	.....	31.61	46.06	24.28	23.32	11.50	8.60	.....
14th "	.....	34.33	52.73	30.89	38·27	.....	12.79	5.2
15th "	.....	35.01	63.13	41.09	46.83	.....	19.04	6.5
16th "	.....	43.51	71.39	50.01	55.29	.....	21.82	7.8
17th "	.....	49.93	80.64	60.43	64.87	(20.73)†	26.03	9.5
18th "	.....	60.77	99.09	66.60	74.16	(27.97)†	30.09	12.2
19th "	.....	72.42	.....	73.40	83.13	(31.38)†	36.72	21.4
20th "	.....	77.32	.....	75.40	91.57	.....	.....	24.0
21st "	.....	79.33	.....	.....	93.35	.....	.....	27.88
22d "	.....	81.35	.....	.....	94.52	.....	.....	31.30
23d "	.....	.....	.....	.....	95.31	.....	.....	35.33
24th "	.....	.....	.....	.....	96.19	.....	.....	36.35
Average life	10 years	16 years	13·5 years	16 years	15.1 years	19,6 years.	19.5 years	25 years

Average life of 1,334,215 unimpregnated ties on 12 German railroads, 13.6 years.

* These 18,600 oak ties used on the Rheine-Emden Railroad, were joint-ties, the 161,615 pine ties in the following table were intermediate ties.

† The figures in brackets refer to 6,246 ties between Bremen and Sebaldsbrück

and corrosive sublimate, in consequence of their higher cost and the difficulty of employing them, can only be considered as of secondary value."

At the Stuttgart technical convention, it was ascertained, that in 1877 the ties on 40 railroads in the German Railroad Union were impregnated, while in 1868 the process was only in vogue on 28; of these 40 roads, 5 used blue vitriol, 8 corrosive sublimate, 13 creosote, 20 chloride of zinc and 5 a mixture of chloride of zinc and creosote; to understand these figures it is necessary to state, that on several roads more than one system of impregnation is employed.

According to the unanimous opinion expressed by the roads taking part in the Stuttgart convention, that have used any one of these systems of impregnation, the success of the process is indisputable, and none of these administrations have any idea of abandoning it.

All that is left for us to do is to choose the method that is most advantageous from a financial point of view, and in this respect the above mentioned convention expressed itself as follows:

"As the experience of those railroads that have for from twenty-five to twenty-six years impregnated their ties with chloride of zinc under pressure after steaming and abstracting the sap (Hanover railroads, Brunswick railroads and others) has been very satisfactory, and as this system costs only one-half to one-third as much as impregnation with creosote or corrosive sublimate, the majority of railroads have adopted the chloride of zinc process."

In spite of these favorable expressions of the latest technical convention, there still remain in Germany and Austria some 57 roads which do not impregnate their ties, we will therefore in the accompanying tables compare, according to the latest and most trustworthy results of the experience of the German Railroad Union, the durability of unimpregnated with that of impregnated ties, which will be found to support the theory, that the impregnation of railroad ties *is of financial importance.*

TABLE B.

Comparative Durability of Unimpregnated and Impregnated Fir Ties.

The number of ties changed, expressed in percentage of the original number laid, was:

FROM THE FIRST YEAR TO THE	UNIMPREGNATED TIES.				IMPREGNATED TIES.			
	Tilsit-Intersburg R. R., 68,291 ties laid in 1864	Leipzig-Dresden R. R., 93,543 ties laid in 1856	Schlesgwig R. R., 146,800 ties laid in 1854	Oppeln-Tarnas R. R., 79,300 ties laid in 1856-57	Boiled in blue vitriol—Berlin-Potsdam, Magdeburg R. R., 36,040 ties laid in 1850	Steeped in blue vitriol—Lübeck-Büchen R. R., 60,000 ties laid in 1851	Blue vitriol under pressure—Magdeburg-Wittenberg R. R., 111,044 ties laid in 1849-50	Chloride of zinc under pressure—Rheine-Emden R. R., 161,515 ties laid in 1854-55
5th inclusive	1.16	11.72	2.0	16.6	0.93	0.0	0.2	0.06
6th "	4.02	23.11	8.2	37.5	1.97	0.0	0.8	0.16
7th "	14.20	35.86	22.0	58.0	2.94	0.0	1.5	0.31
8th "	32.02	47 10	51.5	77.0	4.73	1.0	3.0	0.60
9th "	44.70	61.50	62.5	84.9	7.98	2.5	4.1	0.69
10th "	55.82	73.70	75.5	91.9	12.11	5.8	5.8	1.10
11th "	68.08	86.40	80.0	98.9	17.47	19.0	8.5	1.30
12th "	78.52	100.0	86.5	.....	23.99	30.6	12.6	1.40
13th "	82.77	.....	90.7	.....	31.14	40.6	14.9	1.60
14th "	.....	.....	.....	.....	38.50	49.0	17.3	2.7
15th "	.....	.....	.....	.....	50.20	57.0	19.4	3.5
16th "	.....	.....	.....	.....	66.20	66.0	20.9	5.7
17th "	.....	.....	.....	.....	.....	69.0	.....	8.4
18th "	.....	.....	.....	.....	.....	.....	.....	13.3
19th "	.....	.....	.....	.....	.....	.....	.....	20.8
20th "	.....	.....	.....	.....	.....	.....	.....	26.9
21st "	.....	.....	.....	.....	.....	.....	.....	31.6
22d "	.....	.....	.....	.....	.....	.....	.....	37.3
23d "	.....	.....	.....	.....	.....	.....	.....	42.3
24th "	.....	.....	.....	.....	.....	.....	.....	46.3
Average life	9.4 years	7.9 years	8.6 years	7.0 years	14.0 years	13.9 years	16.0 years	22.8 years

Average durability of 882,407 unimpregnated ties on 6 German railroads = 7.2 years.

Average durability of 831,341 ties impregnated, according to different systems on 13 German railroads = 14.0 years.

TABLE C.

Durability of Pine and Beech Ties.

The number of ties changed, expressed in percentages of the original number laid, was:

FROM THE FIRST YEAR TO THE	PINE TIES.				BEECH TIES.		
	Unimpregnated.		Impregnated with		Impregnated under pressure with		
	North & South Union R. R., 223,640 ties laid in 1858	Western R. R. of Saxony, 20,720 ties laid in 1856	Chloride of zinc by steeping—Altona-Kiel R. R., 3,800 ties laid in 1852	Blue vitriol by steeping—Aachen-Düsseldorf R. R., 32,348 ties laid in 1852-53	Chloride of zinc—Hanover R. R., 81,002 ties laid in 1852	Creosote—Cologne-Minden R. R., 21,440 ties laid in 1853	Chloride of zinc—Brunswick R. R., 600 ties laid in 1852
5th inclusive	40.6	24.9	24.0	14.0	0.86	0.04	.....
6th "	62.4	66.5	33.0	21.0	1.56	0.04	.....
7th "	81.3	100.0	50.0	31.0	2.19	0.15	.....
8th "	94.6	.....	73.0	41.0	2.72	0.76	.....
9th "	109.0	.....	84.0	41.0	3.70	1.64	2·2
10th "	.....	.....	91.0	49.0	4.90	3.01	7 2·2
11th "	.....	.....	95.0	52.0	7.68	7.62	11.7
12th "	.....	.....	98.0	.....	13.06	13.66	39.3
13th "	.....	.....	98.0	.....	19.68	17.57	40.0
14th "	.....	.....	98.0	.....	25.40	20.05	40.0
15th "	.....	.....	100.0	.....	34.50	22.49	42.0
16th "	.....	.....	.....	.....	.....	24.48	.....
17th "	.....	.....	.....	.....	.....	28.09	.....
18th "	.....	.....	.....	.....	.....	31.89	.....
19th "	.....	.....	.....	.....	.....	44.97	.....
20th "	.....	.....	.....	.....	.....	46.91	.....
The average durability is	5.2 years	5.1 years	6.6 years	9.6 years	14.8 years	17.8 years	13.0 years

SUMMARY.

From the statements furnished above, as well as from other sources of information respecting the durability of ties, we will gather in concise form the most important conclusions.

1. The average life of unimpregnated ties on the German and Austrian railroads has been as follows, up to the present time:

For oak ties	13.6	years.
" fir "	7.2	"
" pine "	5.1	"
" beech "	3.0	"

2. The average life of ties impregnated in a rational manner, with creosote or chloride of zinc under a powerful pressure, reaches:

For oak ties	19.5	years.
" fir "	14 to 16	"
" pine "	8 to 10	"
" beech "	15 to 18	"

3. The average life of 831,341 pine ties on thirteen German railroads, impregnated on various systems, is calculated at 14.0 years.

4. The plan of simply steeping the ties cold in the impregnating fluid, or warming them or boiling them therein, has been abandoned by most of the roads formerly practicing it, owing to its unsatisfactory results, and the system of impregnating under a strong pressure is being universally adopted.

5. A few roads steep their ties in corrosive sublimate without pressure and are satisfied with the result.

6. The employment of blue vitriol for impregnation is being more and more abandoned in favor of chloride of zinc, because:

a. The result is not so satisfactory, which may be owing to the fact that only steeping, or at most a weak hydrostatic pressure, is employed for impregnation.

b. Because an expensive copper-tank is required for the purpose.

c. Because the material itself is almost four times as expensive as chloride of zinc.

7. The results of impregnation with chloride of zinc and creosote are about equal. But as the impregnation with creosote costs about three times as much as with chloride of zinc, a majority of the German railroads have gone over to the latter.

8. An idea of the systems of impregnation now in use, compared with those employed in the years 1865 and 1868, may be gathered from the following table compiled from the report of the technical convention held in Stuttgart in 1878:

9. In addition to the methods of impregnation, we have other circumstances that exercise considerable influence on the durability of the ties. Among them we may reckon especially the amount of traffic over the road, the permeability of the ballast, the protection of the ties against rapid changes of temperature or degree of moisture by covering them with a layer of gravel, and the extent to which the ties had been dried before and after impregnation and also before being laid.

Although we possess few figures respecting the influence of the above-mentioned conditions on the durability of the ties, we find that the German Railroad Union collected a quantity of general experience, the result of which was the adoption of the following conclusions, unanimously or by a great majority, at the technical convention at Stuttgart in 1878:

a. The ballast most favorable to the durability of the ties is that which is cleanest and most free from earthy particles, that allows the water to run through it easily and is least affected by the vicissitudes of the weather.

b. That a covering of clean gravel, which protects the ties from the influence of the sun's rays, or, in other words, from light, and also from the rapid changes from heat to cold and from wet to dry, is most advantageous for the preservation of the ties.

c. That a thorough air-drying of the ties before laying them on the road has a favorable effect on the durability, both of impregnated and unimpregnated ties.

d. That ties made from timber felled in winter, especially when they are not impregnated, have been found, after many years' experience, to possess much greater durability than those made from trees felled in the summer.

e. That, to ensure successful results, all ties that are to be impregnated with creosote under pressure, or by steeping in corrosive sublimate, must be thoroughly air-dried or artificially dried before impregnation, whereas such ties as have been steamed and deprived of their sap previous to being impregnated in partial vacuo with chloride of zinc or blue vitriol do not require to be dried.

While from the foregoing we may recognize the advantages of impregnating ties, even in the case of a road which can obtain wood at comparatively low prices, I will add a few calculations, which, although to a certain extent based on estimates, will show the great economical importance of impregnating railroad ties.

Of the 60 million ties, speaking in round numbers, that are laid on the German and Austro-Hungarian railroads, about 25 millions are impregnated, the remainder being unimpregnated. Of the latter some 15 millions are of oak, the remainder of pine, fir, and other soft woods. According to the foregoing tables, the average life of an oak railroad tie, when unimpregnated, is about 13.6 years, when impregnated 19.5 years; and the average life of fir and pine ties unimpregnated is 6.1 years, impregnated 12.0 years.

Taking the average price of impregnated oak ties at one dollar, and pine and spruce ties at 62½ cents, and supposing the cost of impregnation, including interest and sinking funds for the capital invested in the construction of the impregnating works and transportation (taking into consideration the constant spread of the system of impregnating with the cheap chloride of zinc) to be about 12.5 cents for oak ties and for pine or spruce ties about 15.0 cents, we obtain the following results in round numbers: The fifteen million unimpregnated oak ties have cost $15,000,000, and represent with their average life of 13.6 years, a yearly expenditure of $1,102,500. The twenty million unimpregnated fir and pine ties, at 62.5 cents, have cost $12,500,000 and the necessity of replacing them every 6.1 years represents an annual outlay of $2,047,000. The cost of maintaining the unimpregnated ties amounts therefore to $3,150,000.

Had they been properly impregnated, the fifteen million oak ties at $1.12½ cents, including impregnation, would have cost $16,875,000 and with an average life of 19.5 years would have entailed a yearly expense of $865,000 for replacement, while the twenty million pine and spruce ties, at the rate of 77 cents, would have cost $15,500,000, and lasting an average 12 years they would have cost annually 1,350,000 for replacement.

The cost of replacing the thirty-five million unimpregnated ties we have shown to be $3,150,000, while had they been impregnated they would only have cost annually $2,215,000. *By impregnating those ties we should, therefore, have saved each year* $935,000.

Such figures call loudly enough for the universal introduction of the impregnation of ties, and require no further explanation.

There is but one thing more we should like to say.

Those who do not find the foregoing, which is the experience hitherto obtained of the success and financial importance of impregnation, sufficiently convincing, will have little chance of being speedily convinced, as the continuance of statistical observations respecting the life of impregnated and unimpregnated ties has greatly increased in difficulty, and indeed has almost ceased.

Toward the end of the period of renewal, the ties that were originally laid are very difficult to distinguish from those that were replaced later. A second period, when further experience will be possible, will only occur when the proceeding recommended at the technical convention of 1868 in Munich, and confirmed and again recommended at the Stuttgart convention in 1878, has been generally adopted for a series of years; it consists of driving into every tie, when laid, a nail, bearing, impressed on its head, the date of such laying. We cherish the hope that the number of roads will be small that will wait for the results reported at the expiration of the second period, before being convinced of the advantages of impregnation, and the great saving in the maintenance of railroads effected by this process.

Recent Applications of Tools and Machinery in Locomotive Shops.

[Report of Committee on Tools and Machinery, submitted to the thirteenth annual convention of the Master Mechanics' Association at Cleveland, May 13, 1880, by J. D. Barrett of the Grand Trunk Railway.]

STRATFORD, April 5, 1880.

To the American Railway Master Mechanics' Association:

GENTLEMEN.—Your Committee on "Tools and Machinery" beg to submit the following report, not so much as a contribution to knowledge, or of little-known facts, but as a statement likely to call for discussion, and thus give our successors next year (for we hope our little success will not discourage) some broad and general idea of the special matters to which they are expected to give their attention.

DESCRIPTION OF THE FLUE CUTTING AND SCARFING MACHINE, DESIGNED AND BUILT BY J. JOHANN, MASTER MECHANIC.

The method which I employ of piercing flues is by brazing, and as the old methods of cutting and scarfing required considerable time and labor, it became desirable to perform this work specially. The accompanying "blue print" is a representation of the machine which was built for this purpose and which has been in use for two years, giving entire satisfaction.

It consists of a plain box-stand, having a cast-iron head movable around a central pivot. This head supports a stepped pully and hollow spindle through which the flue is passed and held by means of a three-jawed chuck.

When cutting off flues the head is placed central and bolted down by means of side bolts.

When scarfing it is turned to the right or to the left, according as the scarf is to be on the outside of the flue (fig. 1) or inside of the flue-piece (fig. 2).

After scarfing the flue-piece the tool is pressed up against the edge, when a shoulder on the tool turns the edge over as shown in fig. 3. The flue and piece are then pressed into each other, when it is ready for the brazing wire. The advantages of this machine are:

1st, In the rapidity with which the work may be performed; 2d, it secures a perfect joint and a straight flue; 3d, in permitting the use of cheaper labor, as it is so simple a boy can and does tend it; 4th, its capability of performing other work when fitted with a different chuck.

Very truly yours,
JACOB JOHANN, Master Mechanic.

SLIDE-BAR GRINDING AND TRUING MACHINE.

The lowest part of this tool resembles a small planing machine. Its narrow traveling bed is hollow or dished, has pinching screws at sides to hold the slide-bar, and is partially filled with water to keep the bar cool. On the upper portion of the fixed frame is mounted a dry emery or buffing wheel, six or seven inches broad, having a slow side traverse as well as a quick revolving motion. A broad leather or rubber apron is attached to each end of the traveling bed (falling over carrying rollers at ends of the fixed frame) to keep the V sides of the machine free from grit and dust.

Its work is highly finished on the wearing surface, true and free from winding, and a single-bar machine will turn out from 8 to 10 slides per day, or barely one per hour, and a man could attend to more than one such tool if required.

FLEXIBLE SHAFT.

This needs no description. A No. 6 with twist drills will be found of great service in the repair and erecting shop; but its greatest utility is found to be in the boiler shop where the power of a No. 8 is required for tapping holes and screwing in stay bolts.

The use of long screwed stays is rapidly taking the place of crown-bars on the fire-boxes, and an ordinary mogul will require 180 such crown stays. The tapping of both crown-sheets (at the same time) in position by hand occupies one man 45 hours, whereas, with the assistance of the flexible shafts, the long, unhandy top can be passed through at a uniformly steady speed, making a cleaner, truer thread, in 18 hours.

These taps, in themselves expensive tools, will also have a longer life.

To tap the four sides of a mogul fire-box by manual labor will occupy 60 hours, and to put the screwed stays in from 15 to 20 more, whereas, with the assistance of the shaft, both can be done, and the work finished in 21 hours.

Perhaps a better way of contrasting the economy of its adoption in the boiler shop is that the contract price for labor on new fire-boxes for old eight-wheeled engines is reduced $25, simply by allowing workmen to have the use of the shaft.

It should be understood that in entering screwed stays the shaft can pass them through the first plate, until they reach the second; but if they are the tight fit they should be, the work of passing them through the second plate has to be done by hand.

The totals before given include this finishing by hand.

MOULDING MACHINE.

If, as often happens when rolling stock is reduced to standard, castings are daily being made from one pattern, a moulding machine will reduce the cost of labor to a low figure.

Its construction is simple: a stout iron is mounted on trunnions with half of pattern standing out in relief on each side of this reversible plate, which is also provided with pins to temporarily secure the moulding flasks down to the plate.

'Tis but a boy's work to put the flask in place, cotter up, dust, fill and ram sand in a rough, rapid way; strike off all loose sand from flask, swing the plate over so that the flask comes to under-side, by foot lever lift a light lower table up to flask, uncotter, and by same foot-lever lower the separated flasks and half-mould to the level of the floor, whence it is removed to any part of the shop.

The same operation is then gone through with the second flask on what is now the upper side of plate with the other half of pattern, the two flasks are then cottered together.

You see its advantages are: No skilled labor is required, and the daily production per machine is enormously large. The flasks must be made to gauge, as they have to be freely interchangeable and yet fit square and true. One pair of stout carrying frames for a machine may of course be arranged for number or series of trunnioned plates having the half patterns in relief on each side.

Perhaps it is in the brass foundry, making journal bearings for car axles, that its value will best be realized.

PORTABLE POWER.

An excellent way of getting over the difficulty often experienced in working portable cylinder borings and facing machines, valve face planers, etc., in erecting and repair shops by power without moving the locomotives about, is by running a one-inch steam pipe down or across the whole shop having T connections and taps at each engine stall, and using a portable engine, which, by flexible tube, can take its supply of steam from the inch pipe at the T.

Engines of the steam-hammer type suitable for this work are made weighing but 100 lbs. (without the fly-wheel, which is a separate piece). Thus they are readily removed from one point to another where required, and are ready for use at once.

MACHINES FOR SMITH'S SHOP.

For cutting bar, angle or tee iron (either hot or cold) a quick-moving circular saw (driven by small independent engine if the shafting is not near) is the cheapest and readiest means.

In addition to this service, a thoughtful workman, by fully utilizing this saw, will save much fine smith's work and slotting machine work.

So useful is it found to be that shops, having once introduced it, wonder how ever they got along without it.

It is believed that smithing too close to finished sizes is over expensive compared to its absolute value, it being better to use stiff machine tools and to take off heavy shavings in finishing.

This being open to question, it might be a good subject for next year's committee to give their attention to. Elliptic and other plate springs now form a large account in railway work, and it is possible to bring down their cost of manufacture (even on short, light springs) to 85 cents per 100 lbs., allowing ample proportion for general shop charges.

The best designed machine for this work is provided with knife and variable gauge, so that the bars are cut off cold to any desired length of spring plate, by eccentric rolls are tapered down to thin edge on the flat when warm, and at the same heat by third action—a squeezing motion—reduced at the ends to proper width, and by fourth action—done at second heat—punch in centre of plate the recess on one side and nib on the other by which the plates, when in the spring, are kept in place.

The iron buckle should be welded, shaped and put in place on springs at one heat.

One of the rarely developed capacities of a punching-machine is that by using a square or rectangular punch it is possible to cut out plates as thick as 1¼ in. very close to marked outline. An expert hand has done this accurately with the punch, making from 18 to 20 strokes per minute, and for doing a similar class of work, that is, cutting out plate-frames for locomotives, belly-stays and motion-plates, a heavy band-saw has been used. There are, however, but few shops with work enough of this kind to justify the expense of such a tool.

The general use of steel boiler plates has caused the introduction of variable multiple drills where they were never before seen. An excellent way to control the amount of feed is to have the bed which carries the work on its top lifted up by hydraulic pressure from below, the pump for same being worked from the horizontal drill shaft, and the stroke of its plunger varied at discretion by use of a simple form link-motion, as shown on drawing attached (which, however, is a drawing for a machine drilling the six holes in bent truck straps at one operation).

As an economy in time in the use of hydraulic wheel presses, it may be noted that the best are now supplied with two sizes of plungers to their feed pumps, so that the ram shall travel quickly until it meets heavy resistance, when the small plunger alone is brought into use.

To use power instead of manual labor in cleaning up the sides of exhaust and steam ports on cylinders can be done by using a milling tool on the end of drill spindle of a radial drilling machine. To properly guide it, a thick template with slots through it corresponding to the ports is bolted to the valve seat face. A slide block fitted to traverse these slots and having central hole for drill spindle insures the correctness of the work as to size and line

Such an apparatus can be used where the small amount of new cylinder work will not justify a separate slotting machine specially fitted up for this duty, which will finish the corners square instead of round, as is done by the milling tool.

We would suggest as material for the consideration of next year's committee: The relative value of smithing close to sizes.

The highest economical speed in feet per minute of surface cut our ordinary shop tools can be run.

Portable riveting machines.

Plain hemp rope as a substitute for ordinary leather belting.

Special adaptations of milling tools for locomotive purposes (illustrated by complete drawings of the cutting tools and the finished work, and giving the cost or time required to do the work).

THE SCRAP HEAP.

Tom Paine's Bridge.

In a paper read by Mr. Picton before the British Iron and Steel Institute, last September, the following passage occurred:

"One of the first employments of iron on a large scale was in the construction of bridges. In the sixteenth century a proposition was made by Italian engineers to construct a bridge in cast-iron, but the scheme proved abortive. In 1755 an iron bridge was projected at Lyons, to consist of three arches of 82 feet span. Part of the work was actually prepared and put together in the builder's yard, but from some cause not recorded this attempt was also abandoned and a timber bridge substituted. In 1777 the first iron bridge in England was designed by Mr. Thomas Pritchard, an architect of Shrewsbury, was constructed by Mr. Abraham Darby, of Coalbrook Dale, and erected over the Severn at Broseley in 1779. The span is 100 feet; the arch nearly semi-circular. Soon after this date the idea of constructing bridges in wrought-iron occurred to several French engineers, and several designs were prepared for works at Paris and elsewhere, but they were not carried out. In 1795 another cast-iron bridge was constructed over the Severn at Buildwas, by Thomas Telford, 130 feet span. The boldest conception, however, was the cast-iron bridge over the Wear connecting Monkwearmouth with Sunderland, which was designed by the celebrated Thomas Paine, and was opened in 1796. It consists of a single arch, 236 feet span, with a versed sine of 34 feet. For grandeur of idea, lightness of effect, and economy of material, it has never been surpassed.

Commenting on this, Mr. Jeremiah Head said that among the early iron bridges referred to in the paper was the one crossing the Wear at Sunderland. He happened to have been engaged on the staff when that bridge was rebuilt a great many years ago. He confirmed all that had been said about it. That bridge, originally designed by the celebrated Tom Paine, and afterward put up by R. Hill, consisted of six girders made of a number of small casts put together end to end, and then the two bars extending the whole length were joined on the sides and bolted through, so that the casts were really strung together like a necklace. In between them were ties, cross and diagonal, from end to end. The bridge was so light in construction that he thought no modern engineer would have dared to put up such a thing, and it would only have been done, one would think, by some person who was unaware of the immense risk he was running. Nevertheless, this bridge stood, and carried all the traffic between the two sides of the river for a great many years. Eventually, these girders seemed to get out of line; some of the casts were broken, and they became wavy so that they were not in a direct line. Still the townspeople of Sunderland were proud of their structure, and when it was decided to rebuild it they were desirous that these girders should be preserved. The late Robert Stephenson strengthened it by putting in three large box-girders, one between each pair of these original ones, and they are now what constitute the bridge. Two of the old girders were preserved. They belonged to the outside ones so that they were still to be seen; but they bore no portion of the weight, and they were there as part of the original structure designed by Tom Paine. The iron was made of cold-blast iron, and he believed there was no other to be had in that day.

A Romance of the Jackson Collision.

John R. Jeffreys, the last victim, with the exception o little Willie Rice, remaining in the city of the Junction railroad disaster in October last, took his departure a short time since for Chicago. Before leaving, the Michigan Central Company perfected a settlement with him for the injuries he had sustained, but the terms are unknown to the public. However, Mr. Jeffreys gave some of his more intimate friends to understand that he was paid $2,000 cash in hand, and is to receive $1,000 a year in addition during the term of his natural life. As he made diligent search for a diamond ring, of a size too small for his personal use, just before his departure, and a figure familiar to our streets in which he manifested an absorbing interest anticipated him a few days in following the star of empire, it is suspicioned that his misfortunes bid fair to culminate in the usual felicity which awaits two hearts that beat as one. Mr. J.'s experience here has been exceedingly romantic, all things considered.—*Jackson (Mich.) Patriot.*

The Williams Headlight Patent.

In the United States Circuit Court, Judge Blatchford has rendered a decision in the case of Irvin A. Williams, of Utica, vs. the Rome, Watertown & Ogdensburg Railroad Company, a test case in the matter of infringements of patents on Mr. Williams' headlights, and to recover royalty damages. Suit was brought in December, 1877, to recover. The advantages of the Williams lamp was the saving made by substituting kerosene for more expensive oil in locomotive headlights. The Rome road had eleven lamps in use from Dec. 19, 1865, to Oct. 29, 1879, when the first order of the court in the case was filed. Judgement for Mr. Williams was given, and Wm. H. Bright, of Utica, was appointed master to assess the damages. He reported that $224.95 should be allowed for the saving in like quantity of oil by the Williams combination, and that the the amount due by reason of the economy in the use of kerosene was $3,290.94. The sum of $143 was allowed for royalty. At the March term of the Court in this city, Master Bright's report, filed the previous December, came up for hearing, and exceptions were taken. Judge Blatchford has just handed down his decision. He disallows the exceptions with two exceptions. As these were taken upon the royalty report and the defendant waived that point, a decree was ordered for $3,545.80 by Judge Blatchford. Master Bright is now engaged assessing damages on 250 lamps that have been in use by the Boston & Albany road. A large number of the Western roads have been availing themselves of the benefits of Mr. Williams' patents, and the suit against the Rome road being looked upon as a test case, it is probable that nearly half a million dollars depends upon the result of suits already commenced.—*Utica (N. Y.) Herald.*

A Stern Chase.

Yesterday forenoon a loaded flat car on the Terre Haute & Logansport Railroad broke loose from the train at the junction and started rapidly down the grade toward the depot on the main track. As soon as the engine could be freed from the train the engineer put her out in pursuit. The grade is quite steep, and the car advanced rapidly in speed. By the time it reached the depot the car was going at the rate of nearly 60 miles per hour, with the engine thundering close in the wake. The passenger train from the north was around the curve, and the smoke had already begun to show. The pursuing engine was making an effort to capture the runaway before it should meet the passenger train, for right at the curve a collision and smash up would certainly occur. It was nip and tuck. The engineer had to guard closely to keep from running into the car, and at the same time go close enough for a man to jump upon it from the front guard. Fortunately, the passenger engineer saw the car in time to reverse his engine, and the pursuers fastened on the crazy car and wheeled it back again to the city. The escape from a collision of the two trains or of the car at the street crossing was narrow and fortunate.—*Crawfordsville (Ind.) Journal, May 22.*

Paying for their Coal.

Some little excitement and sensational interest has been aroused here by the railroad officials of the New York, Pennsylvania & Ohio (Atlantic & Great Western) Railroad, unexpectedly presenting their bills, yesterday, to some fifteen or twenty of their employes at the railroad shops, who have been obtaining their winter's supply of coal from the company in a quiet way, thinking no one had observed their proceedings, but during the past few months it has been noticed, although no particular attention was paid to the matter until the employers heard the statement, when they quietly took steps toward ascertaining who the guilty ones were. Several of the officials have recently been here and the railroad detective, Nelson, has visited this place a number of times, and lately, as these depredations have been carried on to such an extent, that the company found it necessary to "come down" on the guilty parties, making them settle up the bills presented, which ranged from $15 to $100 each, or a total sum of nearly $500. A majority have already settled the accounts, thinking it the speediest way to get out of trouble; and as some others feel inclined that way, they will probably do so before the matter goes any further; or is, perhaps, carried into court.—*Kenton (O.) letter in Cincinnati Enquirer.*

Wear of Rails on an Incline.

On a down grade of 1 in 38 on the Aachen Railroad, in Germany, the amount of rail wear per 1,000,000 kilometric tons (of 2,205 lbs.) gross weight was 3.059 in., so that a rail was completely worn out in five years. On Aug. 10, 1878, as an experiment, cast-steel brake-blocks were substituted for the wrought-iron ones on the left side. On taking measurements May 6, 1879, it was found that the left rail was worn down 0.287 in., the right rail 0.35 in., while formerly the rail on the right side was least worn. For the sake of obtaining a certain result, the brake-blocks were exchanged right with left, on the 6th of June, and the height of the rail (twenty lengths on each side of the track) carefully measured. According to the measurements made on Sept. 18 and Nov. 24, 1879, the wear on the steel brake-block side amounted to 0.05 in., on the side where the wrought-iron blocks were used, 0.086 in. per million tons gross load. On a down grade of one in seventy-five, between Heissen and Mülheim, the rail wear, with a gross load of 34 million tons, amounted to 0.507 in. in eight years. The Chief Engineer of the road can only attribute the enormous amount of wear to the fact that the soft wrought-iron blocks hold the wheels perfectly tight, while the hard steel has not such a grip on them, they occasionally slip round, and less friction results to the track.

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EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published*

THE PHILADELPHIA & READING.

The period of renewed prosperity which the country has been enjoying for a year past has been rudely interrupted during the past week by a failure of gigantic proportions. The Philadelphia & Reading Railroad and its subordinate coal and iron company, representing a capital of about $125,000,000 (nearly the same as that of the New York Central & Hudson River Railroad Company) failed to meet its paper due last Friday, and this week was put into the hands of receivers. Only last January, in his report to the stockholders, President Gowen estimated that the net earnings of the company for the current year would be sufficient, not only to meet all the fixed charges, but to produce a 12 per cent. dividend on the capital stock in addition! This was little more than four months ago, and now the company fails for lack of a comparatively small amount to meet maturing notes. Evidently if the public's estimate of the prospects of the company had been equal to Mr. Gowen's, this failure would have caused universal dismay and gone far to plunge the country into the hopeless condition which for so many years after 1873 caused stagnation of industries and paralyzed enterprise. Its effect, however, has been comparatively trifling, except on the holders of its obligations and shares. There is properly a good deal of apprehension in the whole business of mining and carrying anthracite coal, but otherwise confidence in the healthfulness of business and readiness to embark in any promising enterprises have been very little affected. It is doubtful if there will be any less production of manufactures, including iron, or any fewer new industries established this year than if the Reading had remained solvent. The failure of a corporation with a capital of such an enormous amount must of course fall heavy upon the many who have invested in its securities; but even this is less severe than in most failures of the great railroad companies. The fact is, Reading did not fall with a crash because it had not far to fall, and it was known that it had not. Three years ago its financial condition was such that it could not pay all the interest on its funded debt and it then made an arrangement with its bondholders by which it was relieved from the cash payment of some of the interest as it fell due, issuing scrip instead, which went to increase the amount of the debt on which interest would finally have to be paid. About one-half of this period for funding interest has now expired, but in spite of this relief the floating debt of the company has increased to enormous proportions, and in every one of the past four years there has been a deficit.

We publish elsewhere a letter from a Philadelphia correspondent which criticises severely the recent management of the company. It is well to say that there are two parties in Philadelphia, one of which has long had faith that Mr. Gowen was doing what under the circumstances was best for the company, while the other has condemned his policy as reckless and sure to end in ruin. Our correspondent evidently belongs to the latter party; he follows to a considerable extent the statements made some years ago by Mr. Charles E. Smith, Mr. Gowen's predecessor in the presidency of the Reading, and those of a pamphlet published a few years ago by George McHenry (a brother of James McHenry), which latter gave such evidence of being prepared for stock-jobbing purposes that no one was likely to pay much attention even to the truth that it might contain. We are more inclined to criticise than to endorse our correspondent's letter. Certainly most of its statements of the growth of the capital of the company do not justify the inference that there was not a corresponding growth in the property. There is no reason for suspicion even because a company borrows more money the same year that it pays dividends, or increases its capital without increasing the mileage of its roads, especially when the company is one like the Reading, with an immense variety of property (not considering its coal mines), aside from its railroad proper—enormous yards and docks on navigable waters, a fleet of steamers, etc. Moreover, no adequate motive has ever been assigned for a policy of knowingly and continuously paying dividends out of capital. We believe that Mr. Gowen's bitterest enemies never accused him of making money out of his position, either by operating in his company's securities, or by corrupt contracts for railroad leases and purchases of mining lands. Indeed, so far as reports reach us, the Reading has the reputation of being an unusually clean administration, and the fault found with it aside from being sanguine to the point of recklessness, has been the sufficiently grave one that it has endeavored to make its shareholders and creditors and the general public expect results, which the managers with their knowledge must have known to be altogether improbable, in order to secure the bare but very remote possibility of restoring the company to sound prosperity. The complications of this company's property is such that we have never felt able to give a confident estimate of its value; but really it did not seem reasonable to expect such profits, even with the "boom" at its highest, for this year as were given by Mr. Gowen in the estimate referred to at the beginning of this article.

But whatever exception may be taken to the tone or the statement of our correspondent's letter, there can be little doubt that the Reading has been dragged down by its purchases of coal lands; not by its becoming a coal miner, as is often said, but by investing an enormous capital in coal mining property. The company paid altogether too much for the mining properties from which it obtains coal. Nearly $70,000,000 have been invested in the auxiliary coal and iron company, and yet that company has every year, we believe, netted a loss on its business, so that the railroad company had not only to pay interest on the cost of the property of the coal and iron company, but something more for the privilege of carrying on its business. Last year the loss of this company was $700,000. The largest tonnage ever produced from its mines was 5,570,000 tons last year. Now the capital invested in them is at the rate of about $12.50 for every ton then raised, interest on which is not less than 75 cents. This may seem a small sum to pay for coal in the mine—equivalent to royalty in an opened mine—but experience has shown that it is only under exceptional circumstances that the mine-owners can get so much. The cost of mining and carrying such a bulky merchandise bring up the cost to the consumers, so that a comparatively small increase in the price limits consumption; and moreover, since the coal-carriers went into the business of mining, so many mines have been opened that they cannot all be worked steadily without overstocking the market. They worked pretty steadily last year, and this brought down the price so low that it yielded no or very little profit either to the miner or the carrier, and still the cheapness did not stimulate consumption up to anything like the full capacity of the mines. Then there had been light demand and production for many years, and the collieries and the supply of miners had run down so that they were not in condition to yield as much as in 1873, nor as much as they could easily be made to yield now. An effort has been made to get a little higher prices this year and with success so far, without much decreasing the consumption (which, however, should have been much greater than last year, because of the much greater demand from iron works and other manufactories), and yet, for some time, the companies have had to work but half time to avoid overstocking the market.

But although the Reading has been dragged down by the great debt incurred to secure a profitless coal property, it is by no means certain that it would have escaped disaster if it had refused to follow the example of the other coal roads and remained a simple carrier, leaving the ownership and the working of the mines to whom it might concern. Indeed, there is good reason for thinking that utter failure might have overtaken it years ago had it followed the latter policy. When we charge the failure of the company on its coal purchases we will do well to consider what the condition of affairs in the anthracite coal fields was when the Reading began making purchases. This was very clearly set forth in the argument made by Mr. Gowen before a joint investigating committee of the Pennsylvania Legislature in 1875—a most able and instructive document, which was widely published at that time and which deserves to be read again at this time. In 1871, when the Reading Company first obtained authority to own mining property, every rival coal-carrier had already secured great coal properties; all the coal fields but the two from which the Reading carried (the Schuylkill and the Mahanoy) were pretty fully occupied by these rival roads, they had taken part possession of the Mahanoy field, and they had planned the construction of a line directly through the Schuylkill field. Following their policy elsewhere it was reasonable to suppose that they would buy the mines, that they might secure the coal shipments for their own roads. Under these circumstances the Reading Company had no alternative: it must control mines or expect to lose its coal traffic—all that made it an important road. Mr. Gowen describes the situation and the policy and action of the company as follows in speech above referred to.

"In this connection I desire to refer to the act of 1869, which has been alluded to by both of our friends on the other side. The allusion almost provoked a smile, when I remembered the history of the act and the desperate battle fought in the Legislature by the Reading Railroad Company against its passage. The act of 1869, entitled "An act to authorize railroad and canal companies to aid in the development of the coal, iron, lumber and other material interests of this commonwealth,' was an act of assembly introduced into the Legislature entirely in the interest of the rival lines that I have spoken of, for the purpose of enabling them, after having located their roads, to buy lands in our own territory. It was approved on the 15th day of April, 1869. I was, at that time, the counsel for the Reading Railroad Company, and I well remember the earnestness with which the company and its counsel opposed the passage of the bill. The utmost that we could secure, however, was that very amendment, which I believe was drawn by myself, and which prevented the act having any operation in the county of Schuylkill. We could do no more than that. It opened Northumberland County, where our lines were existing, it opened Dauphin County, where we already had lines of railroad and coal interests, to our adversaries; and the utmost that we could do was to keep Schuylkill County away from them; but it only kept Schuylkill County away from them so far as concerned the power to purchase the stock and bonds of coal companies, but wherever coal land was owned by individuals, they had the right to buy. Thus attacked, as I have shown, what could we do? Were we to lie still? Were the managers of the company to remain quiet and see the tonnage diverted from their own line? We had nothing to do but to fight the enemy with their own weapons. The policy had been inaugurated by the commonwealth of Pennsylvania, Her legislative power had given to these rivals of ours an ability to defeat us in our own region and at our own home; and no other way in which we could protect ourselves was left open for us except that of becoming the owners of coal lands."

It should not be forgotten that defeat is not always due to bad generalship. There are cases where of two policies open one leads to early the other only to late failure, one to great, the other to less serious disaster, and as much judgment may be shown in choosing the better way, which after all leads only to the less of the two evils, as in other cases choosing what leads to brilliant success. Neither should it be forgotten that the experience of many years before the purchase of coal lands by the Reading led men nearly everywhere who had to do with the anthracite interest to place what now seems to be a greatly exaggerated value on coal property—especially on unopened coal lands. And in view of the fact that the other coal carriers had been for some time purchasing

such property, and so making a market for it, and by their competition forcing up prices, it is questionable if the mistake made by the Reading was not more in buying so late than in buying at all. If the policy which it originally favored had prevailed throughout the anthracite region, and none of the carriers had become mine-owners or miners, doubtless it (and probably the other roads), would have been much better off; but when it became necessary to own mines, in order to secure any share of the coal traffic, that company was likely to do best which bought earliest and at the lowest price.

THE MASTER CAR-BUILDERS' ASSOCIATION.

Every person who has ever given any attention to the subject is agreed that it would be very desirable, and that very great economy would result, if the different parts of railroad cars, especially those which require most frequent renewal, could be made uniform and interchangeable. There are, however, several very serious obstacles which stand in the way of this much-to-be-desired end. One of these is the difficulty of coming to any determination which will be certain to be always right, and then of establishing standards of reference of such a character that the correctness of what is agreed upon can always be verified. A much greater amount of skill and care is required in fixing such standards than is ordinarily supposed. In fact, science has been defined as "definite knowledge," and an essential characteristic of advancing science "is increase in definitness." Just in proportion then as rules and established standards became definite and precise, they assume a scientific character, and they can only acquire this if care, skill and knowledge are exercised so as to make them so. The difficulties in the way of doing this are not apparent to ordinary people who have never had their attention especially called to this subject, and yet it is illustrated by the care which is required to establish and maintain our standards of ordinary measurement. Nothing seems easier to a mechanic than to make an object an inch, or a foot, or a yard, or ten inches, feet or yards long; and yet if great precision is required, doing so is attended with the greatest difficulty, and absolute precision evades us altogether. In an article published in the *Journal of the Franklin Institute*, of last February, Professor Hilgard, of the United States Coast Survey, who is "in charge of the verification of standards," gives in "a brief and categorical form" the sources from which the standards of length in use in this country have been derived. It may be said, briefly, that these are the same as those lawful in Great Britain. There, what has been known as "Bird's standard," which was a metal yard which had been in the custody of the Clerk of the House of Commons since the year 1760, was the original from which all subsequent measures of length were derived. In later years, according to Professor Hilgard, "this had been become inadequate in definition," and between the years 1816 and 1826 a new set of standards "of such finished workmanship and precise definition as were required by the science of the time" were made, and "the old standard yard was reproduced with the greatest possible exactness." By an act of Parliament of 1824 the old yard is retained as the standard of length, and "in order to verify it, in case of destruction, a ratio was established between its length and the length of a pendulum. "It was found that a pendulum, vibrating seconds in the latitude of London, measures 39.1393 of such inches as are marked in this standard yard." "In 1834 all the standards were destroyed by the burning of the Parliament buildings." They have since been reproduced by reference to all the former accredited standards with with they had been originally compared, and are known as the Imperial standards. Some fifty copies of these were constructed and intercompared, and certain of these have been sent to the United States." * * "The actual standard of length in this country has been a bronze scale of 82 inches, subdivided in silver to tenths of inches, which had been prepared for the coast survey of the United States by Troughton of London. The 36 inches comprised between the 27th and 63d inches found equal to the average of the whole scale, were taken as the standard yard." The date when this scale was made is not given by Professor Hilgard, but it was before 1836, and it is not clear whether it was derived from the standards which were destroyed by fire or from those reproduced afterward. It was, however, compared with one of the latter (No. 41), and it was found that the former was nearly one thousandth of an inch in the yard too long. By a more recent comparison of one of the fifty standards named (No. 11), by Professor Hilgard at the British Standards Office in London, the latter was found to be 0.000088 inch too short. As he well remarks, these differences "are really of no consequence in ordinary practice."

He says further: "Extreme accuracy in this matter is beset with great difficulties, for in addition to that of ascertaining for each particular bar the rate of dilation by temperature, there is an uncertainty in regard to permanence in the length of the bars themselves. Of the two standard yards presented to the United States, one is of bronze (No. 11), and the other of Low Moor wrought iron (No. 57.) These are found to have changed their relative length by 0 00025 inch in twenty-five years; the bronze bar being now relatively shorter by that amount. This subject is undergoing further investigation."

But some readers may say, in what way does this extreme precision concern railroad men? To which it may be said that it is not given as a matter of direct concern to them, but as an illustration of the difficulties which are encountered whenever an attempt is made to establish any absolute standards. But the subject is not without some direct interest to those of our readers who are in charge of or employed in the mechanical departments of railroads. In the *Railroad Gazette* of the 9th of January last, an article on "Standard Screw Threads" was published in which a general statement was given of the difficulties which have stood in the way of the manufacture of taps and dies which would cut bolts and nuts that would be interchangeable. The fact that the tools made by the most prominent manufacturers will not always do this is quite clearly established. In that article some specifications were given which it was thought might, if generally adopted, secure uniformity, or at least interchangeability. Since this article was written, we learn that the Morse Twist Drill Company and the Pratt & Whitney Company, have agreed to have a joint investigation made of the whole subject, and that they have engaged a firm in Wilmington, Del., which manufactures gauges and other instruments of precision, to do it. It seems certain that this will result in establishing a standard which will be sufficiently precise to insure interchangeability. When this is done, though, the standard will require to be formulated in some authoritative way, so that railroad managers and those in charge of the machinery and rolling stock on different lines may know clearly what the standard actually is. Now to do this, there must be some representative body to sanction it and thus establish the authority for it. Without some co-operation on the part of railroad companies, or their officers, the latter may long for years for uniformity without being any nearer to it. The question then is, how can this co-operation be brought about. There seems no probability that any new organization will be formed for this purpose, and for any immediate prospect of having such work done we must look to the Master Mechanics' and Master Car-Builders' Associations. These, it is true, are not as effective as they might be in doing such work, but it now seems that it would be wise if the managers and superintendents would give whatever aid and assistance they can, and thus help to improve these associations, and thus make them more useful, rather than to ignore them altogether because they do not conform to some more or less indefinite ideal.

There are directions in which the need of reform in these associations is manifest. One of these is the basis of representation. It is quite natural that a manager should refuse to accept a standard for cars which was established by the votes of car-builders representing roads whose cars are numbered by tens, where those of his line are counted by thousands. The just basis would seem to be that in all matters concerning the construction of cars, the representatives of different lines should have a voice somewhat proportionate to the equipment owned. If this principle were established and managers were invited to send representatives, it is believed that such an invitation would now meet with a general response.

But these associations are also inefficient in another way, and they can never do the work they should unless the deficiency is supplied. When a prudent person buys a piece of real estate, he is careful to have its location, its limits and bounds, and all the restrictions to which it is subject, expressed in the most exact and precise terms and figures. Experience has taught that the only safe way to have this done is to employ a lawyer or expert in the conveyance of real estate, one familiar with the laws and terms and other intricacies of titles. Now, establishing a standard is analogous to making a deed to property, in that it is of the utmost importance to specify with the most absolute precision what the standard or property is. The force of this will be apparent from a few illustrtions. As most of our readers know, for a number of years the two associations named have been engaged in discussing, reconsidering and recommending a standard car-axle. Finally, by the joint action of two committees, the standard was fixed, it was believed, irrevocably. When this was accomplished, it was important to specify exactly its form and dimensions. On investigation a half-dozen or more of drawings and engravings were found to be extant, but all differing more or less from each other—fortunately not in any essential points—and all were claimed to be *the* standard. The committees referred to finally agreed upon a drawing as *the* standard, in which the original and essential dimensions were retained, and the other discrepancies were reconciled. This has been engraved, and a certificate of the committees to its correctness has been printed with it and extensively distributed. This fixes the standard, so that hereafter it will always be possible to verify the dimensions of the axle which were recommended.

The case of the standard journal-bearing, journal-box and pedestal recommended by a committee of the Car-Builders' Association some years ago is, though, much worse. That committee agreed upon patterns for these parts, and they were then placed in the hands of a draftsman to be drawn, and the drawing was afterwards lithographed. Now, the number of sources of possible error should be observed. First, the committee may have made mistakes; second, the pattern-maker had an opportunity of falling into error; third, the draftsman may not have been exact; and fourth, the lithographer may have blundered. Judging from the result, each one of these improved the opportunity thus afforded. In the lithograph the objects intended to be represented are not shown clearly, and for this reason the writer a few months ago entertained the idea of having the journal-bearing engraved separately, as that was the part requiring most frequent renewal. In order to be quite certain that this engraving would be correct, he procured a pattern made from the original, and compared that with the lithograph. Not only did the one not agree with the other, but, on careful examination, it was found that the sum of the short dimensions did not agree with the long dimensions. The measurements, too, were often given in odd thirty-seconds and sixty-fourths, so that a workman would be driven almost to distraction in attempting to work to them. In fact, the supposed standard is a muddle which can only be straightened out by a thorough re-investigation of the whole subject, which it is proposed shall be given to it by a joint committee of the two associations. Not only is the lithograph—which should be the standard of verification—not correct, but it is said that the original design is in some respects very defective, so that the castings are heavier than they need be and give a smaller amount of service than they should.

Now it may be stated generally, that the design of machinery or any other complicated mechanical structure must of necessity be the work of a single individual. No more inefficient instrumentality for doing it could be found than an association or a committee. Designing is executive work, and the experience of the world for centuries past has settled down to the conclusion that such duties must be entrusted to a single person. In short, then, what is needed in the Car-Builders' Association to establish standards of uniformity, is some person to perform the duties of an actuary, that is, some one to whom the work of the Association could be referrrd, to be put into definite shape. Such a person should be an expert in car construction, and be a throughly competent designer of work pertaining thereto. If the services of a man with these qualifications, and of unimpeachable integrity, who would not convert his influence and responsibility into an article of barter and sale, could be obtained, the effectiveness of the association, and its value to railroad companies, could not only be very much increased, but it would be able to undertake work which it is now impossible for it to do.

THE LAW OF THE BELL AND WHISTLE.

Quite a number of decisions have been rendered in the courts of the country, during the past year or two, upon railroad signals. The duty of announcing, by bell, whistle or flag, the approach of a train, has been drawn in consideration under novel circumstances and in a variety of aspects.

Every reader knows that some duty of this kind is at the present day almost everywhere imposed by statute, or, where railroads laid in city streets are concerned, by municipal ordinances. Thus, precisely what signals must be given, at any specific place of crossing, is governed, not by any general principle which the courts assert, but by local rules, which may and do vary in different localities. But the administra-

tion or enforcement of these local rules is guided by principles which have general interest.

One question has been: Does the engineer, by giving the statutory signal, discharge the whole duty of the company, or is there an obligation, in addition, to exercise care not to do injury? This question was presented in a suit against the Erie Railway, recently decided. Two men in a wagon drove toward the crossing just as a train had passed; the conductor, however, had need to back the train, which was done unexpectedly to the travelers, and one of them was hurt. There was a dispute as to what signals were given, but, upon the whole, the facts appeared to be that the law only required the engineers to sound the signals as the trains were approaching crossings while running their trips, and did not lay any command upon them in respect to backing a train which had overrun its stopping place. The company's counsel argued that the engineer had complied with the law, such as it was, and nothing more could be demanded. The Legislature had undertaken to say what signals should be given, and they had been given, promptly and faithfully. If they were not enough, the fault was in the law; the company had performed its whole duty. But the Court said that, independent of any law, railroads are bound to use judicious, prudent means to warn all travelers of danger from their engines and cars, and passing a law to command this in some specific cases does not diminish the obligation of doing it in other cases where common sense demands it. Between an injured traveler and the company the question is, not whether the statutory signals were given, but whether the signals given were reasonable and sufficient under the circumstances. The obligation of the company is double: to obey the statute and to give any person rightfully approaching the track due warning of his danger. Therefore the wagon-riders were held entitled to damages. Very nearly the same decision was made in an Alabama case.

A converse question often presented has been: Does an omission to give the statutory signals expose the companies to any other or higher liability than if there were no statute? Three opinions have been, in past years, expressed. An early view was that the statute is a matter between the company and the public authorities only; it does not give the traveler any claims. If the engineer disobeys or neglects it, the company must respond to whatever penalty is imposed for the breach; but when a traveler sues, the only question is whether the trainmen were negligent toward him, and the statute has nought to do with this.

Next, it came to be said that disregard of obligatory signals was, at least, a strong circumstance to show negligence, if, on other facts, that question was in doubt; the courts might rightly consider that signals commanded by law were judicious and prudent ones, and such as ought to be given. Still later has arisen the opinion that as these precautions are prescribed chiefly for the purpose of securing the public safety, they ought to be enforced for the public protection; that travelers on the highways have the right to expect that signals directed by law will be given, and, if these are omitted, a traveler is not in fault for driving upon the track in confidence that no danger is impending. The current of thought during the past two years has been in favor of the latter view. Omitting signals directed by law may, in many courts, expose the company to liability to travelers, irrespective of the signals having been superfluous, or of others, which the injured person did not understand, having been given. Thus the Alabama Supreme Court has declared, in two cases, that failing to sound the whistle or ring the bell, being a breach of a duty enjoined by statute, fixes the charge of negligence on the company; and any one injured may recover damages unless his own negligence has contributed. The Tennessee Supreme Court has followed nearly the same doctrine.

Upon the other hand, if the engineer promptly and faithfully gives the required signals, this will go far to throw the responsibility on the traveler. The engineer is justified in supposing that the traveler can see and hear and will understand the sounds and obey them; there must be clear neglect of obviously proper care beyond this to render the company chargeable. In an Indiana case a man was walking along the road-bed, when a train approached behind him. The engineer sounded the bell and whistle; but the pedestrian kept on his way without turning, and was run over and killed. He was not deaf; and the explanation of his conduct undoubtedly was that he was walking upon a side-track and supposed the train was running upon the main track, and that he therefore had no need to turn off. In fact, however, the switch was adjusted to bring it upon the side-track. In the suit for damages the plaintiff's lawyers urged that the engineer ought to have slowed the engine rather than run over a man in plain view, even if he was obstinate and reckless in keeping in the way. But the Court said that the engineer had the right to presume, up to the last moment when turning off would have saved the man, that he heard and understood the signals and would leave the track. And by the time it was too late for him to do so it was much to late to stop the train. In Rochester, N. Y., a deaf and dumb man came at midnight to a place where the street crossed the Central Railroad track. There was a freight train just passing. He waited till it had passed, looked both ways for any other cars, saw none, and essayed to cross. But, unhappily, a locomotive with tender was backing toward the spot, about fifty feet in the rear of the freight train. Of course he could not hear its approach, and as it was backing, and had no lantern upon the rear end, which was toward him, he failed, in the darkness, to see it; and he was run over and killed. It was proved that the engine and tender were running much faster than the city ordinance allowed; and the Court said that a jury might fairly say, under the circumstances, that the deaf and dumb man was not in fault, and that the trainmen were. If so, the company must pay damages.

The purpose or reason for requiring these signals was drawn in question in a somewhat peculiar New York case. A woman driving alone in a horse and buggy drew near to a crossing and looked and listened carefully for a train. One was approaching, but it was not visible in consequence of obstructions; and the engineer neglected to give the signal until she had reached a spot very near the point of crossing and the locomotive had quite reached it. A loud blast of the whistle was then given; it frightened the horse, although a steady one, and he backed and turned suddenly and the fair driver was thrown out and badly hurt. The company's lawyers thought she had no case because it was giving the signal, not omitting it, which led to the injury, and neither horse nor driver was touched by the cars. But the Court said that these signals are for a two-fold purpose; they are required quite as much to caution travelers who are approaching that they should keep back until the train has passed, as to warn those who may be actually on the track to hasten over before it is upon them. And if the jury believed that this woman would, if the whistle had been earlier blown, have halted far enough before reaching the track to have prevented the horse from taking fright, she might, so the Court decided, recover damages. And there have been other instances in which the injury done has been by frightening a horse, not by actual collision; enough to warrant saying that signals must be given in a considerate, prudent manner; an engineer is not warranted by a general direction to sound his bell or whistle in a way which is reckless or perilous under the special circumstances.

It remains to say that the duty imposed by law on train-men does not relieve travelers of the obligation of exercising all due care. Because signals have been wrongfully omitted is no reason for requiring a company to pay damages to a person who has brought injury upon himself by his own inattention or foolhardiness. Many cases illustrate this. A remarkable one occurred in Missouri. There was a little girl eight or nine years of age, named Stillson, described in the case as being "the pet of her father, and of the entire village where she lived," and so "sprightly and attractive," that the judge, in his grave, written opinion, felt called upon to say that the judges and jurors might not find it easy to avoid being influenced by sympathy for her. Her father kept a store upon one side of a railroad track, and lived with his wife and daughter at a hotel on the other side. One day, he went home to dinner, and on his return to the store his daughter accompanied him. As they walked toward the track, she asked: "Papa, how did you get over?" This was because the track appeared quite filled up with stationary cars. He explained that he had found a gap between two cars, and had got through there. This was so; but since his crossing the cars had moved somewhat, and the gap, which was large enough before noon, had now been made very small. Before he could check her she said: "I will beat you over to the store," and ran in advance of him toward the gap. It was now so narrow that she had to "squeeze through." As she was doing so, the cars, without any signal that they were about to move, were started, and she was crushed between them at the waist. It was considered an important fact in deciding the case that the affair did not occur at a regular street-crossing, but at a point in the company's yard where there was no ordinary invitation for persons to pass across. The Court held that irrespective of the neglect to sound a signal, no damages could be recovered, because the child and her father were wanting in proper care, in her attempt to pass between cars under such circumstances.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Cheraw & Salisbury.—Completed from Cheraw, S. C., northward to Bennett, N. C., 23 miles.

Dayton & Southeastern.—Extended from Coalton, O., east by south to Wellston, 7 miles. Gauge, 3 feet.

South Pacific Coast.—Extended south to Felton, Cal., 2 miles, closing the gap and completing the road. Gauge, 3 feet.

St. Louis & San Francisco.—The track of the *Kansas Division* is extended from Augusta, Kan., westward to Wichita, 21 miles.

Kansas Central.—Extended westward to Garrison, Kan., 44 miles. Gauge, 3 ft.

Burlington & Missouri River in Nebraska.—Track of the *Republican Valley* line extended from Arapahoe, Neb., westward to Indianola, 30 miles. A branch of the same line is finished from Red Cloud eastward to Spring Valley, 25 miles.

Union Pacific.—A branch has been completed from Grand Island, Neb., northward to St. Paul, 20 miles.

This is a total of 172 miles of new railroad, making 1,502 miles thus far this year, against 570 miles reported at the same time in 1879, 385 miles in 1878, and 393 miles in 1877.

PENNSYLVANIA RAILROAD EARNINGS IN APRIL for all lines east of Pittsburgh and Erie, show the very large increase of $858,344, or 32⅝ per cent., and though the increase of expenses is very large—25 per cent.—the increase in net earnings for this one month is no less than 45 per cent., amounting to $464,554, which is of itself enough for a dividend of ⅝ of 1 per cent. on the company's stock. The gross earnings, working expenses and net earnings in April for the past three years have been:

	Gross earnings.	Working expenses.	Net earnings.
1877	$2,344,714	$1,765,149	$579,565
1878	2,507,815	1,632,509	875,306
1879	2,628,032	1,598,994	1,029,038
1880	3,486,376	1,992,784	1,493,592

Thus since 1877 the increase has been 49 per cent. in gross and more than 157 per cent. in net earnings—certainly a very remarkable recovery.

For the four months ending with April these results are:

	Gross earnings.	Expenses.	Net earnings.
1877	$9,184,586	$3,400,006	$2,784,560
1878	9,446,089	6,100,062	3,348,027
1879	10,312,564	6,193,785	4,208,779
1880	12,792,690	7,189,370	5,603,320

The gain since last year is 24 per cent. in gross earnings, 18 per cent. on working expenses, and 33 per cent. in net earnings, and the gain in net earnings is equal to a little more than 2 per cent. on the stock. Since 1877 the increase for the four months has been 39 per cent. in gross and a little more than 100 per cent. in net earnings. Even this, however, does not show fully the improvement in the financial condition of the company. Compared with last year this company's lines west of Pittsburgh and Erie (which it does not work directly) have for the four months an increase of $1,238,671 in their profits, which is equal to about 1¾ per cent. on the stock of the Pennsylvania Railroad Company.

For the rest of the year it is hardly likely that the improvement will continue so large. May traffic has not been heavy, and a large traffic is not to be looked for until after harvest; and then the comparisons will be with a period when traffic was heavy and rates good. At this time last year the through east-bound freight traffic (but probably not the local freight nor the through west-bound nor the passenger traffic) was larger than it is now, but the rates were much lower.

The New York Central & Hudson River road's earnings for the first four months of this year compared with last year show an increase of 18.2 per cent., against one of 24 per cent. on the Pennsylvania; and for the month of April its increase is 25.6 per cent. against the Pennsylvania's 32⅝ per cent. Considering the extent to which the Pennsylvania's earnings are affected by activity in iron manufacturing, it was to be expected that it should gain more in proportion than its great competitor for the carriage of through freight.

THE PRESERVATION OF TIES is the subject of an important paper by Privy Councillor Funk, Superintendent of Construction of the Cologne & Minden Railroad, published in a recent number of the leading German technical railroad journal, a translation of which is published in this number. The statistics are fuller and the information more definite than we have found anywhere else—and more decisively in favor of the treatment of ties, of all kinds of wood. On that subject there seems to be but one opinion in Germany and Austria, though in many parts of those countries ties are comparatively cheap—quite as cheap as in many parts of this country. It is noticeable that chloride of zinc has displaced most other materials in Germany as an antiseptic for this purpose; but the process used is substantially the same whether chloride of zinc or creosote is used, the result, so far as the life of the preserved ties is concerned, is almost identical, and the choice is merely a question of cost.

In this connection we are glad to be able to present definite information as to the life of ties on one American road, called out by our article last week. Maj. E. T. D. Myers,

General Superintendent of the Richmond, Fredericksburg & Potomac Railroad, writes us that on that road, which is 82 miles long and has an average of 2,730 cross-ties per mile, the average life of white-oak ties 6 × 8 in. to 10 in., and 8 ft. long, has been eight years. For the past ten years 12½ per cent. of the ties have required renewal every year on the average. These ties are always winter-cut, always barked, chiefly hewn, and laid in good gravel ballast. The German experience indicates that the life of these ties would have been increased *eleven and a half years* by impregnation under pressure either with creosote or with chloride of zinc.

THE NEW YORK FREIGHT LAW was further changed in the Senate on Thursday of last week by leaving out the important amendment adopted the day before which excepted from the operation of the bill through shipments from points without the state. Motions to substitute the Assembly bill and the third section of that bill were defeated by the large majority of 23 to 8, and as amended the bill passed by a very large majority, many who opposed it voting for it on the ground that the alternative was between that and a worse bill. The bill, having been amended, was returned to the Assembly and referred to the Railroad Committee. It and the Assembly refused to accept the Senate amendments, and a conference committee was appointed. The large vote in the Senate against substituting the House bill for its own, above referred to, makes it improbable that any considerable changes in the direction of the original form of the bill will be consented to, and on the other hand it is said that it is doubtful if the bill with the Senate amendments ever passes the House. As the Legislature was to adjourn on Thursday of this week (just after we go to press), it is quite probable that no vote will be reached even if the conference committee succeeds in making a bill acceptable to the members of both houses.

The bill regulating voting on the stocks and bonds of corporations (intended to prevent abuses in voting on proxies) has passed both houses and will doubtless be approved by the Governor. It was not opposed.

WATER RATES have suffered very moderate changes during the past week. Lake rates have been maintained throughout at the highest figures at which they closed last week—5½ cents a bushel for corn, and six for wheat from Chicago or Milwaukee to Buffalo. Canal rates have yielded a quarter of a cent, and for several days, and until Wednesday, stood at 5 cents for corn and 5½ for wheat from Buffalo to New York, but Wednesday boatmen were asking half a cent more. By far the larger part of the grain is forwarded by water, and consequently an unusual proportion of it to New York. The grain movement, too, is unusually heavy, and more than a million bushels were received, and three-quarters of a million shipped at Chicago in a single day (Tuesday) of this week. The proportion of rail shipments from Buffalo has increased recently, however, and there are some indications that irregular practices of some kind have increased the shipments by certain railroad routes from the West.

Ocean rates for some weeks have been generally 4½d. to 5d. per bushel for grain by steam from New York to Liverpool, but within the last two or three days cargoes have been taken at 4d. Flour Tuesday was quoted as low as 1s. 6d. per barrel and 12s. 6d. per ton—about 11 cents per 100 lbs.—and bacon and lard at 17s. 6d. per ton. These rates are about as low as those of last year, while lake and canal rates are very much higher—lake rates more than twice as high.

WESTERN CROP PROSPECTS seem to be very generally favorable. Winter wheat, which has been sown to a greater extent than ever before, is fully as promising as last year (when the yield was the best ever known) everywhere except in Western Kansas, where there has been no rain since November, and there is little hope of crops of any kind this season. But it must be remembered that comparatively little land is under cultivation in this part of Kansas; the bulk of the production in the state is in the eastern third or half of the state, where the prospects are fair. In Nebraska, and even in the eastern part of it, there has been much suffering from drouth, but favorable weather hereafter may change the prospect; not much winter wheat is raised there. In Minnesota, though there has been some diversion from wheat to other crops in the southern part of the state, the area in wheat, taking the state altogether, is considerably larger than heretofore, and the prospects so far are good, and also in Wisconsin. There is plenty of time for injury to the spring crops, but by this time the growth of winter wheat is pretty well assured, and the dangers still to be encountered are limited chiefly to rust and bad harvest weather.

THE AMERICAN SYSTEM OF CHECKING BAGGAGE was discussed at a recent meeting of the Railroad Society of Berlin, the subject being brought up by Dr. Wedding, who urged its advantages, and asked the Society to interest itself to secure the introduction of a similar system, modified to suit the customs there prevailing in Germany. After a long discussion the Society referred the matter to a committee to report at the next session. The chairman of this committee is Mr. H. Bartels, who has published works on American railroads and is favorably impressed with many of our methods, and one of the members is Dr. Reuleaux, who was wonderfully pleased with our traveling accommodations when he was in this country.

May Meeting of the Joint Executive Committee.

In compliance with a call from Mr. Albert Fink, the Chairman, a meeting of the Joint Executive Committee was held at No. 346 Broadway, New York, beginning Tuesday, May 25. Mr. Albert Fink in the chair and Mr. Crosby, Secretary.

The following railroad companies belonging to the Committee were represented at the meeting:

Baltimore & Ohio.
Boston & Albany.
Boston, Hoosac Tunnel & Western.
Cairo & Vincennes.
Canada Southern.
Chicago & Grand Trunk.
Cincinnati, Hamilton & Dayton.
Chicago, Burlington & Quincy.
Cincinnati, Indianapolis, St. Louis & Chicago.
Cleveland, Columbus, Cincinnati & Indianapolis.
Evansville & Terre Haute.
Fitchburg.
Grand Rapids & Indiana.
Grand Trunk.
Great Western.
Indianapolis & St. Louis.
Indiana, Bloomington & Western.
Illinois Midland.
Lake Shore & Michigan Southern.
Louisville, Cincinnati & Lexington.
Louisville & Nashville.
Marietta & Cincinnati.
Michigan Central.
New York Central & Hudson River.
New York, Lake Erie & Western.
New York, Pennsylvania & Ohio.
Ohio & Mississippi.
Pennsylvania Railroad.
Pennsylvania Company.
Philadelphia, Wilmington & Baltimore.
Pittsburgh, Cincinnati & St. Louis.
Vandalia Line.
Wabash, St. Louis & Pacific.

The companies members, but not represented at this meeting, were the Central Vermont, the Chicago & Alton, the Detroit, Lansing & Northern, the Evansville, Terre Haute & Chicago, the Lake Erie & Western, the New York & New England, the Peoria, Pekin & Jacksonville, and the Toledo, Peoria & Warsaw.

The list of members includes three more than at previous meetings, namely, the Boston, Hoosac Tunnel & Western, the Grand Rapids & Indiana, and the Peoria, Decatur & Evansville.

The meeting was opened by an address by the Chairman, Mr. Fink, in which he recounted the subjects to which the attention of the committee would be called at this meeting, and stating that he felt the need of rest, indicated his intention to be absent in Europe for two months during the summer. In order that the Joint Executive Committee might not suffer any embarrassment from his absence, he offered his resignation as Chairman.

The question of Mr. Fink's absence and resignation was taken up and disposed of by the following resolution, passed unanimously:

"*Resolved*, That, with the expression of the continued confidence of the Joint Executive Committee in the fidelity, impartiality, fairness and intelligence of Commissioner Fink, this meeting declines to replace him with any other appointee and cheerfully grants him the leave of absence desired, in the hope that he may return to his duties reinvigorated by rest."

The Committee on Classification, to which sundry questions had been referred at the last meeting, made the following report:

"COMMISSIONER'S OFFICE,
"New York, May 24, 1880.

"The permanent Classification Committee met at 11 a. m., pursuant to the call of the Chairman. Present: F. H. Kingsbury, R. W. Geiger, A. B. Leet, H. W. Gays (representing Lucien Hills), A. W. Street, G. G. Cochran, C. L. Cole, J. M. Osborn, J. A. Grier, J. T. R. McKay.

"Owing to the large number of applications to be considered, and in consequence of the misunderstanding which has hitherto arisen on digerent occasions, it was decided that every change in, or addition to the classification should be made by resolution in writing, and full and free discussion allowed, so that each member of the Committee might thoroughly understand the action taken.

The following additions were made to the classification, viz:

Barley, sprouted	same as grain
Brooms, splint, L. C. L.	2
Cinders, mill and slag	same as pig iron
Copper, residue, C. L.	8
Copperas in bbls or boxes, C. L.	7
Furniture, school, knocked down, packed, O. R. C. L.	6
Same, etc., set up, O. R., actual weight, C. L.	3
Grind stones, mounted, C. R.	1
Same, etc., mounted, O. R	3
Hose reels, K. D., packed	1
Meats salted in cans, boxed	7
Money drawers, boxed or crated, O. R.	1
Mouldings, in rough, C. L.	6
Moss, flax, pressed in bales, C. L., actual weight	5
Oil, except coal, carbon or oleomargarine in hhds. or bbls., O. K, of leakage, 50 bbls. or over	7
Pins, boxed, C. L.	6
Roofing tile	same as sewer pipe
Saw frames, boxed, L. C. L.	5
Same, C. L.	7
Scale boards, L. C. L.	6
Same, C. L.	7
Spelter, in slabs or casks, C. L.	7
Stoves, oil, boxed or crated, O. R.	3
Wall protectors, boxed or crated, O. R.	2
Wood flooring in boxes	6
Wood cornices in boxes, L. C. L.	2
Same, C. L.	6
Wood pipe for water, sewer or gas, C. L.	10

The following changes were made in the classification, viz.:

Bullion, base, value not to exceed $100 per net ton	10 to 7
Butter, butter-grease, butterine and oleomargarine, in any quantity	3
Candles, less than 50 boxes, 4; changed to less than 25 boxes	4
and 50 boxes and more, 6; changed to 25 boxes and more	6
Canned goods, 7, Changed to canned fish, vegetables, berries, fruits and potted meats	6
Dressed hogs in refrigerator cars, C. L., minimum weight 20,000 lbs	4
Eggs, in any quantity	3
Bedsteads, common, in white or stained, O. R., in car-loads, actual weight	6
Bone black, in packages, C. L.	6 to 8
Handles, L. C. L.	5 to 6
Hay, C. L., to be governed by Rule 14 as to weight.	
Jewellers' sweepings and tailings	1 to 2
Oil, except coal, etc., 5 packages or more to read 5 packages or more and less than 50 barrels	6
Ore, silver or lead, value not to exceed $100 per net ton	10 to 7
Pins, boxed, L. C. L.	2 to 3
Pump tubing, L. C. L.	3 to 6
Sausage, canned	6 to 7
Skins, sheep and others, dry, 1, To read skins, sheep and others, L. C. L., in bundles not otherwise specified	2
Skins, sheep, green, 3, to read skins, sheep and others, in bundles not otherwise specified, L. C	3

The following articles were stricken out of classification, viz.:

Car-load rate on butter, butter grease, oleomargarine and eggs.

Wool, Mexican or Santa Fe, pressed in bales. This makes all wool first and second class.

Application for changes in the classification of the following articles were laid on the table, there being no good reason for any change, viz.:

Butter in cans, sewing machines returned, show cards, straw boards, coffee extract, hair, safes, sausage casing, hides, wool, white lead, whiskies, beer.

Rule 2 has been changed to read Rule 2, "*A*." The minimum car-load weight upon all property in 1st, 2d, 3d, 4th, and 5th classes shall be 20,000 lbs., unless otherwise provided for in the classification.

"*B*." The minimum weight per car-load for all property classed less than 5th class, shall be 24,000 lbs., unless otherwise provided for in the classification.

This has been changed to read Rule 10. Shippers are required to furnish ice, used with property classified less than 5th class in car-loads, freight upon the ice not to be charged for.

Rule 11.—To be stricken out.

Rule 12 has been changed to read:

"Rule 11.—Whenever the railroad companies' regular double-lined or provision cars or the Tiffany, Anderson, Davis, Swift, Zimmerman, Ayer, J. Hyde Fisher, or any other patent refrigerator car is used for property classified at 5th class or above, ice may be furnished by the railroad company. When the railroad companies' double-lined or provision cars are furnished for property classified below 5th class, the shipper shall furnish the ice if used. When the patent refrigerator cars are furnished for property classified below 5th class, shippers shall furnish the ice if used, and a charge of five cents per hundred pounds in addition to the rate shall be made.

Rule 13 changed to Rule 12, 14 changed to 13 and 15 changed to 14, and new rule added to be called Rule 15—"The expense for lumber used in skidding when loading high wines, alcohol and whiskey shall be paid by the roads in interest in same manner as is now done for grain-doors, the cost not to exceed $1 per car for the skidding."

Resolved, That in order to correct a misunderstanding, this committee recommend that the rate upon all articles in tenth class, except bullion, base, silver or lead ore, be made the same as lumber, to remain in force until Oct. 31, 1880.

Resolved, That as to the question of classification on tobacco from Chicago and interior points, which was referred to this committee by Commissioner Fink, we recommend that it be referred to the Tobacco Committee, the rates on tobacco from other points having been fixed by that committee, and there being no basis for the Classification Committee to act on.

Resolved, That we recommend to the Executive Committee that such of the changes in classification and rules herein stated as being approved be made to take effect Monday, June 7, 1880. F. H. KINGSBURY, Chairman.

J. T. R. MCKAY, Secretary.

Additions.

Ashes, wood	8
Clam shells in packages	8
Ordnance stores	2
Mineral water in wood, C. L.	7

The changes made in the report before adopting it were: Copper residue was raised from Class 8 to Class 7; canned salt meats, from Class 7 to Class 6 (it was originally in Class 2, but as it really competes with barreled corn beef and other provisions, it would not bear this rate); it was added that the minimum weight of the oil, except coal, carbon or oleomargarine taken in lots of 50 lbs. or over at owner's risk of leakage in Class 7 should be 20,000 lbs. for a car-load; high wines, whiskey, alcohol and spirits were put in Class 1; the same in lots of less than five barrels at owner's risk of leakage with a valuation of not more than $20 per barrel were put in Class 3; and the same in lots of 50 barrels and over but less than 24,000 lbs., owner's risk of leakage and $20 valuation were made Class 5, and the same with the same limitations but in car-loads of not less than 24,000 lbs. were put in Class 6. The special class for flour (Class 9), which has existed probably from the first days of a through rail business, and has always had a rate per barrel equal to the grain rate for 200 lbs., was formally abolished, and flour, barreled corn meal, etc., in car-loads of 125 bbls., were put in the grain class (Class 8), with the proviso that a barrel should be counted as 200 lbs.

A committee, of which Mr. G. R. Blanchard is Chairman, appointed some months ago to revise the new organization and by-laws, reported that the work had developed unexpected importance, and that it was thought best to print a preliminary report and send it round to the different members of the committee for the purpose of drawing out suggestions which might be utilized in making a final report at a later day. The committee's proposition was well received, and it was continued.

Mr. E. B. Thomas, General Manager of the Cleveland, Columbus, Cincinnati & Indianapolis Railway, asked that the rate from Cleveland to New York, which at the last meeting was raised from 65 to 70 per cent. of the Chicago rate to bring it into harmony with the rates to some interior points, be changed back to 65 per cent. A motion to that effect was laid on the table.

The rate of Pekin, Ill., was changed from 111 to 110 per cent. of the Chicago rate, making it the same as the Peoria rate.

The rate on live stock from Peoria was fixed at 3 cents per 100 lbs. above the Chicago rate.

The roads interested in a re-apportionment of the east-bound shipments from Chicago, made to include the Grand Trunk's new line, appointed a meeting to deal with the matter to be held at the Gilsey House, New York, Thursday.

The committee appointed to agree upon an apportionment of the traffic from competitive points in Ontario reported that it had not yet come to a conclusion of its labors.

A committee appointed at the last meeting to consider the differences in the charges for carting from the several stations in the same city at Chicago, Cleveland and Lansing appointed a meeting the next Thursday to consider the subject.

A charge was brought against the Baltimore & Ohio Railroad Company of violating its agreement to maintain east-bound rates, in this, that it has carried grain received by it by vessels at Sandusky for 12 cents per 100 lbs. to Baltimore, instead of 19½ cents, which is Sandusky's regular rate, and its proportion of the Chicago rate. The Baltimore & Ohio claimed that it has a right to make the same lake-and-rail rate via Sandusky as is made by the railroads via Erie and Buffalo. The other roads rejoin that they are bound to maintain rates from Erie and Buffalo on grain received by lake at the regular proportion of the Chicago rate due to the distance of these places from New York, and that if the Baltimore & Ohio may make a lake-and-rail rate via Sandusky as low as that via Buffalo; the Lake Shore may do the same via Cleveland, etc. The matter was referred to the trunk-line presidents for decision, pending which the Baltimore & Ohio agrees to mantain the Sandusky rate as given on the percentage table, namely, 19½ cents per 100 lbs.

The Committee on Charges of Irregularities in Rates reported evidence of such irregularities at Peoria and St. Louis. The pool agent at St. Louis was instructed to take measures directly to even up the proportions of the several roads according to the percentages which have been awarded them; and the roads at Peoria were notified that if the irregularities there were not stopped the trunk lines would refuse to bill freight through and pro-rate in connection with them, and general notice was given that this policy

would be followed at any other places where evidence of irregularities in rates might justify such action.

Various modifications in the tobacco rates were made, to bring them in better proportion at different places. As established the rate per 100 lbs. to New York is 58½ cents from New Albany, 56 from Clarksville, 52 from Paducah, 51 from Owensboro and Henderson, 56 from steamboat landings on the Cumberland and Tennessee Rivers, 49 from landings on Green River, and from other points on the basis of 40 cents from Chicago to New York.

At the close of the proceedings, a resolution was adopted unanimously, to prevent misapprehensions on the part of the public, that it is the opinion of the Joint Executive Committee that there should be no further reduction in east-bound rates.

Notice is given that copies of the revised classification may be had of John T. R. McKay, Cleveland, O., Secretary of the Committee on Classification, at the rate of $1 per 100 copies.

The Committee adjourned Wednesday, after two days' session.

The Atchison, Topeka & Santa Fe and Mr. Thomas Nickerson.

The following is an extract from the records of the annual meeting of the stockholders of the Atchison, Topeka & Santa Fe Railroad Company, held at Topeka, May 13th last:

Mr. Coolidge presented and read a letter from Mr. Thomas Nickerson, dated May 1, 1880, declining a re-election as Director, which letter is as follows:

"BOSTON, May 1, 1880.

"*To the Stockholders of the Atchison, Topeka & Santa Fe Railroad Company.*

"GENTLEMEN: Continued ill health has for some time admonished me that I must relieve myself from the heavy burden which I have been carrying in connection with the affairs of your road.

"In January last, I determined to discharge at once the duty due myself, but I have deferred action until the present time for the purpose of completing important negotiations which were pending at the beginning of the year. I now ask you, in accordance with my purpose, to allow me to decline a re-election as a member of your board of directors. I thank you for the generous support which you have given me in my duties, and leave your service with the best wishes for the future prosperity of your company.

"Yours truly, THOMAS NICKERSON."

Mr. Coolidge then offered the following remarks and resolution:

"It is with much pleasure that I rise to propose a vote of thanks to Mr. Thomas Nickerson, the outgoing President. He served the company with untiring industry, stern integrity and rare ability. He found it an insignificant road; he leaves it—including its branches—1,300 miles in length. He found it without credit; he leaves it with established finances. He deserves, gentlemen—or, more properly speaking, we owe him—our sincere thanks for his past efforts and our best wishes for his health and happiness. I make the following motion:

"*Resolved*, That the sincere thanks of this company be given to Mr. Thomas Nickerson for the fidelity, intelligence and devotion with which for many years he has performed the duties of President."

In seconding the resolution, Col. C. K. Holliday arose and said:

"Mr. President: In rising to second the motion for the adoption of this resolution, I desire to offer a few remarks suggested by this eventful occasion. My long association with Mr. Nickerson in the board, and my very long-time connection with the road itself, may render this undertaking on my part not wholly inappropriate.

"The retirement of Mr. Nickerson from the presidency of the Atchison, Topeka & Santa Fe Railroad Company marks an epoch in its history—an epoch of great success.

"When Mr. Nickerson assumed the presidency of the road six years ago, the railroad interests of the country, as in fact all other interests, were passing through the worst stage of the extraordinary business depression, which overwhelmed the entire country after the disastrous panic of 1873. Herculean efforts had not long previously been made to construct our road through to the west line of our state, in order to save to the road within the prescribed time the valuable land grant of three millions of acres voted by Congress. This successful effort to preserve the grant forced the road far beyond the *then* settlements of Kansas; most of the *now* populous and productive counties lying west of Newton having *then* neither population nor business; while those east of Newton had but a small per centum of the business and population of to-day.

"Only a limited portion of the *then* business of New Mexico and Southern Colorado was shared by our road, the strong competition of antagonistic roads successfully bidding for the trade at both Las Animas and Pueblo; while a threatened movement on the part of one of these roads to extend its line southward along the base of the Rocky Mountains, thereby wholly cutting off our western terminal business, made the outlook still less inviting.

"Under the general business depression then prevailing, one road after another in quick succession failed in its obligations, passed into the hands of a receiver, and changed ownership under process of the courts. Nor were those wanting, even high in our own organization, who in the midst of the general crash felt that it was folly longer to resist the impending fate, and that the Santa Fe, instead of honestly paying its obligations, should have the same, in part at least, wiped out by process of the bankrupt court.

"Then it was—under circumstances like those I have been trying to depict—that Mr. Nickerson, sustained by his very able associates who constituted the board, and having full confidence in the successful issue of the venture, constructed the road through to the Rocky Mountains, thereby securing to it forever the largest portion of the immense and rapidly increasing business of that marvelous country.

"What the business may soon become, so far as the mining interest only is concerned, may be best told by me by quoting an extract from an address but recently delivered by William E. Dodge, entitled 'Old New York.' 'They,' said Mr. Dodge, referring to our transcontinental railway lines, 'will also develop the mining resources of the interior of our continent by the cheap transit of men, machinery and food, so that I venture to predict that, in less than twenty years, the annual product of our gold and silver mines will reach $300,000,000.'

"In the early history of railroad construction the roads sought the people, now the people seek the roads. Then the population preceded the roads, now the roads precede population.

"Therefore, immediately after the construction of our road through Kansas, thousands and tens of thousands of immigrants from all the states of our Union, and from all nations of the old world, began to pour into Kansas, and to occupy the beautiful, the fertile and the inexhaustible lands along the line of our road, and extended far out on either side, until to-day you have a large, remunerative, permanent, and permanently-increasing local business along the line of our road, whereas at the time of its construction you had but little or none.

"Mr. Nickerson having thus brought the property to a condition in which it became self-sustaining, with a prospect of early remuneration to those who had been its steadfast friends in its hour of gloom, the policy of the company would naturally change from the defensive to the offensive: from the protective to the aggressive.

"Hence followed in quick succession the almost completed construction of the line to Leadville, the greatest mining camp on earth,—to the Trinidad coal fields,—out from the Raton tunnel among the flocks and herds upon the plains of New Mexico; and on to the Grand River of the North, with its rich treasures of Spanish story,—on to the ancient city of the Holy Faith, a city old when Jamestown was founded, old when the pilgrims landed upon Plymouth Rock.

"Symbolized by its own monster engine—the huge giant of the Raton mountains—the largest locomotive engine in the world, it has now become a fixed fact that the road itself will very soon become the largest railroad in the world. With its main line extending from the Missouri River to the Rio Grande; and its branches, one along the thirty-fifth parallel to the Pacific Ocean, another through the rich mineral districts of Arizona to Guaymas, on the Gulf of California, and still another, by way of the "pass" between the two great Republics to the very gates of the walled capitol of the Aztecs.

"Marvelous as has been the increase in the business and the increase in the mileage of your road during the six years under consideration, as just exhibited by your President's annual report, who will venture to predict what it may become, or rather what it may *not* become, in the succeeding six, or even three, years.

"With a route favorable for through business at all seasons of the year; with immense and constantly increasing local traffic; with a grand sweep of the vast mineral fields on the eastern slope of the Rocky Mountains extending from northern Colorado to southern Arizona; with the shortening of the route by at least two days' sail to China and Japan, and with the immense traffic which must grow out of the intimate and friendly commercial relations between the states of the two Republics as a necessary sequence of the construction of your road to the city of Mexico, the Atchison, Topeka & Santa Fe Railroad must and will move to the front as the greatest and grandest commercial enterprise of this or any other age.

"As Mr. Webster would say, 'the past, at least, is secure.' And, contemplating the past of our road, who among us, especially during the six years now under consideration, has had so much to do in shaping the policy, sustaining the credit, and maintaining the integrity and economy of the corporation as Mr. Nickerson?

"The future of our road is assured. And, contemplating the future of our road, who among us had so much to do in shaping and mapping out that future as Mr. Nickerson?

"Nay, may I not say that for six consecutive years, as our unanimously chosen President, we all, as a board and as stockholders, looked to him to recommend the measures and indicate the policy which the company should adopt and pursue; satisfied by our knowledge of his extraordinary business qualifications, that both his measures and his policy would contribute to the prosperity of the great trust committed to his keeping.

"I am convinced that the great success of the Atchison, Topeka & Santa Fe Railroad is largely due to the integrity and the economy of the executive management. Mr. Nickerson's known integrity of character, backed up as he was by a board of directors likewise above suspicion, was a sufficient assurance to New England capitalists that the enterprise into which he invited their capital was legitimate and worthy their attention, and that even if it failed such failure would be in defiance of honest and intelligent effort.

"The economy of the management was as conspicuous as its integrity. A little anecdote may best illustrate this. A gentleman called upon a broker in Boston, desiring information concerning the different Kansas railroads. He was about to depart when the broker called his attention to the fact that he had omitted to ask about Santa Fe. 'Oh,' said the gentleman, 'I know all about that road. It is all right, sound as a dollar, perfectly safe. Why, that's the road whose President, when he goes to examine it, rides in the caboose, and carries his lunch with him. You can always depend upon an enterprise which is handled with economy like that.'

"The history of the Santa Fe road is filled with many events of intense interest. Times when the pluck and energy and liberality of one man saved the enterprise from disaster, perhaps from ruin. Those things should be told—in justice to the generous and courageous and self-sacrificing men who sprang to the rescue and saved the enterprise, they should be told—but they cannot be told to-day. This is not the time nor place. To-day and the pending resolution have reference only to Mr. Nickerson's presidency and his connection with the road; and having reference only to him and the very valuable and faithful services he gave to the corporation during his long time connection therewith, especially during his six years' incumbency of its highest office, I can only say in conclusion, if not with as high an inspiration as that with which the words were uttered eighteen hundred years ago, yet with the greatest sincerity and with the profoundest feeling, in which I know you will all concur, 'Well done, good and faithful servant.'

"Mr. President, I second the motion to adopt the resolution."

Col. Holliday's remarks were received with hearty applause, and the motion was carried unanimously, and the Secretary was instructed to have a copy of the remarks and resolutions sent to Mr. Nickerson and spread upon the records.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Chicago & Northwestern, annual meeting, at the office in Chicago, June 3.

Keokuk & Des Moines, annual meeting, at the office in Des Moines, Ia., June 2.

Des Moines & Ft. Dodge, annual meeting, at the office in New York, June 3.

Annual Conventions.

Meetings of various railroad and engineering associations will be held as follows:

The *Passenger Conductors' Life Insurance Company of the United States* will hold its ninth annual convention at the Maxwell House, in Nashville, Tenn., beginning May 31.

The *Master Car-Builders' Association* will hold its fourteenth annual convention in Detroit, Mich., beginning Tuesday, June 8.

The *Yard-Masters' Mutual Benefit Association*, of the United States and Canada, will hold the sixth annual convention at the Revere House, Boston, Mass., beginning June 9 next.

Southern Car Mileage Clearing House Association.

This Association was organized at a meeting held in Chattanooga, Tenn., May 26, at which a number of important roads were represented. The object of the Association is to facilitate car mileage settlements between the railroads south of the Ohio. The office will be in Atlanta.

Meeting to Revise Rules Concerning Repairs, etc., of Interchanged Freight Cars.

The following call has been issued from No. 113 Liberty street, New York, dated May 25, 1880:

"DEAR SIR.—In compliance with the twenty-first section of the "Rules governing the Condition of and repairs to Freight Cars for the Interchanne of Traffic," which were adopted at Chicago, June 11, 1879, I would beg to request the attendance of an authorized representative of your company at a meeting to be held at the Russell House, Detroit, Mich., Wednesday, June 9, 1880, for the revision of the prices contained in the rules and to make such other changes as may be agreed upon.

"This invitation has been extended to all the railroads in the United States and Canada. Respectfully yours,

"LEANDER GAREY,

"President Master Car-Builders' Association."

Railway Purchasing Agents' Association.

The annual convention was held at the Grand Pacific Hotel in Chicago, May 18. The attendance was not very large.

Mr. G. C. Breed, of the Louisville & Nashville, presided, and Mr. Willard A. Smith acted as Secretary.

After the customary routine business had been disposed of, Mr. J. H. Raymond, Secretary of the Western Railroad Association, delivered a short address on "Patents and the Patent Law as Related to the Purchasing Department of Railways." He was followed by Mr. J. C. Febiger, the Purchasing Agent of the Chicago, St. Louis & New Orleans road, who read a paper on "Cotton-seed hulls as a substitute for cotton waste in packing car-boxes." He presented the result of numerous experiments resulting in favor of the former for general use.

Mr. W. S. Cuddy, of the St. Louis, Iron Mountain & Southern, presented the following, which was adopted:

"*Resolved*, That when this meeting adjourns, it adjourn to meet in the city of St. Louis on the third Tuesday of May, 1881, and that the Secretary be instructed to notify all purchasing agents in the United States and Canada that at said meeting in St. Louis the question shall be decided, 'Shall the annual meetings of this Association be continued?' and that a committee of five persons be appointed to prepare a paper showing in brief the object of the meetings of this Association, and that a copy of said paper be sent to the President, General Manager or Superintendent of railroads in the United States and Canadas."

After electing officers for the ensuing year the convention adjourned until the next day.

On the second day the attendance was larger. The members present were: G. C. Breed, Louisville & Nashville; W. R. Shelby, Grand Rapids & Indiana; W. S. Cuddy, St. Louis, Iron Mountain & Southern; E. H. Andress, Lake Erie & Western; H. A. Raymond, Fort Wayne & Jackson; George Tezzer, Cincinnati, Indianapolis, St. Louis & Chicago; C. M. Higginson and William Irving, Chicago, Burlington & Quincy; R. W. Hamer, Chicago & Northwestern; A. V. Hartwell, Chicago & Alton; A. D. Clarke, Union Pacific; F. A. Marsh, Chicago, Rock Island & Pacific; George G. Cook, Flint & Pere Marquette.

The following list of topics and speeches had been announced, but as the speakers came unprepared, the topics were discussed in a general way by all present.

1. Old material—C. M. Higginson, Allan Bourn, A. W. Sumner.
2. Cylinder and valve lubricants—A. C. Armstrong, R. W. Green, J. H. Holway.
3. Manufactured material—A. W. Sumner, W. S. Cuddy, C. M. Higginson.
4. Substitutes for waste in packing—Allan Bourn, W. S. Cuddy, G. C. Breed.
5. Lighting cars—R. W. Green, J. H. Holway, A. C. Armstrong.

The list of subjects was an interesting and important one. The talk was informal; no action was taken, the object being to secure the fullest possible light and knowledge for the future guidance of those present.

The following Executive Committee was appointed, in accordance with the resolution passed on the previous day: Messrs. Allan Bourn, Michigan Central; J. C. Febiger, Chicago, St. Louis & New Orleans; William Irving, Chicago, Burlington & Quincy; E. H. Andress, Lake Erie & Western; and J. H. Holway, New York, Pennsylvania & Ohio.

The meeting then adjourned, to meet at St. Louis on the third Tuesday in May, 1881

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe Leased Lines.—At the annual meeting in Topeka recently the following officers and directors were chosen: *New Mexico & Southern Pacific.*—Directors, T. Jefferson Coolidge, C. J. Paine, I. T. Burr, G. B. Wilbur, Frank Morison, S. L. Thorndike, George T. Anthony, T. Sherlock, H. L. Waldo, W. W. Griffin, E. S. Stover; President, T. J. Coolidge; Vice-President, Manuel A. Otero; General Manager, Wm. B. Strong; Secretary, E. Wilder; Assistant Secretary, G. L. L. Goodwin. *Pueblo & Arkansas Valley.*—Directors, T. J. Coolidge, I. T. Burr, B. P. Cheney, W. J. Rotch, L. M. Sargent, W. B. Strong, M. D. Thacher, O. H. T. Baxter, James Clelland; President, T. J. Coolidge; General Manager, W. C. Strong; Secretary and Treasurer, M. D. Thacher; Assistant Secretary and Treasurer, G. L. Goodwin. *Kansas City, Emporia & Southern.*—Directors, T. J. Coolidge, Alden Speare, I. T. Burr, Warren Sawyer, S. L. Thorndike, S. A. Kent, C. N. Sterry, H. C. Cross, W. Martindale. President, Warren Sawyer; Vice President and General Manager, W. B. Strong; Secretary and Assistant Treasurer, E. Wilder; Treasurer and Assistant Secretary, G. L. Goodwin. *Elk & Chautauqua.*—Directors, T. J. Coolidge, Alden Speare, S. L. Thorndike, L. Turner, E. Hewins, W. B. Strong, E. Wilder, Ross Burns, John Guthrie, Joab Mulvane and T. H. Butler. Ross Burns, President; W. B. Strong, Vice-President and General Manager; E. Wilder, Assistant Treasurer; G. L. Goodwin, Treasurer and Assistant Secretary. *Marion & McPherson.*—Directors, T. J Coolidge, Alden Speare, C. W. Pierce, G. C. Lord, W. B. Strong, Ross Burns, J. R. Mulvane, R. C. Coble, O. Heggelund, J. H. Wright. Geo. C. Lord, President; W. B. Strong, Vice-President and General Manager; E. Wilder, Secretary and Assistant Treasurer; G. L. Goodwin, Treasurer and Assistant Secretary. *Cowley, Sumner & Ft. Smith.*—Directors, T. J. Coolidge, I. T. Burr, C. C. Burr, Alden Speare, C. K. Holliday, W. B. Strong, Ross Burns, J. R. Mulvane, M. L. Robinson, J. H. Foulks, G. A. Hamilton. C. C. Burr, President; W. B. Strong, Vice-President and General Manager; E. Wilder, Secretary and Assistant Treasurer; G. L. Goodwin, Treasurer and Assistant Secretary. *Kansas City, Topeka & Western.*—Directors, T. J. Coolidge; I. T. Burr, Alden Speare, S. L. Thorndyke, C. W. Pierce, B. P. Cheney, G. A. Gardner, G. B. Wilbur, A. J. Dull, D. L. Lakin, R. W. Ludington. T. J. Coolidge, President; E. Wilder, Secretary and Assistant Treasurer; G. L. Goodwin, Treasurer and Assistant Secretary. *Pleasant Hill & De*

Soto.—Directors; T. J. Coolidge, I. T. Burr, G. B. Wilbur, S. L. Thorndike, Joseph C. Stevens, H. Rea, Ross Burns, D. L. Lakin, E. Wilder. G. B Wilbur, President; E. Wilder, Secretary and Assistant Treasurer; G. L. Goodwin, Treasurer and Assistant Secretary. *Florence, Eldorado & Walnut Valley.*—Directors, Alden Speare, I. T. Burr, C. W. Pierce, G. A. Gardner, S. L. Thorndyke, W. B. Strong, E. C. Ellet, T. P. Alexander, G. W. Brown. Alden Speare, President; W. B. Strong, Vice-President and General Manager; E. C. Ellet, Secretary and Assistant Treasurer; G. L. Goodwin, Treasurer and Assistant Secretary. *Osage County Coal & Mining Co.*—Directors, Ross Burns, E. Wilder, G. O. Manchester, A. S. Johnson, Joab Mulvane, G. F. Parmelee, W. G. Dickinson. President, Joab Mulvane; Vice-President, G. F. Parmelee; Secretary and Treasurer, E. Wilder; Superintendent, T. L. Marshall. *Wichita & Southwestern.*—Directors, T. J. Coolidge, S. L. Thorndike, I. T. Burr, Alden Speare, B. P. Cheney, C. W. Pierce, G. B. Wilbur, G. A. Gardner, C. C. Burr, W. B. Strong, W. Griffinstein, M. Kohn, M. M. Murdock. President, I. T. Burr; Secretary and Assistant Treasurer, E. Wilder; Treasurer and Assistant Secretary, G. L. Goodwin. *Manhattan & Blue Valley.*—Directors, W. B. Strong, Ross Burns, W. G. Dickinson, E. Wilder, J. F. Scott, G. O. Manchester, A. S. Johnson, H. R. Hilton, G. F. Parmelee, G. R. Peck, Joab Mulvane. President, W. B. Strong; Secretary and Treasurer, E. Wilder. *Manhattan, Alma & Burlingame.*—Directors, T. J. Coolidge, I. T. Burr, Alden Speare, S. L. Thorndike, E. H. Mason, Elisha Atkins, F. G. Dexter, F. L. Ames, Sidney Dillon, J. F. Dillon, Wm. B. Strong, G. W. Veale, E. B. Purcell. *Arkansas Valley Town Co.*—Directors, Alden Speare, Emmons Raymond, C. W. Pierce, I. T. Burr, G. B. Wilbur, W. B. Strong, W. G. Dickinson, C. P. Bolmar, E. Wilder; President, Alden Speare; Secretary and Treasurer, G. L. Goodwin. *Walnut Valley Construction Co.*—Directors, I. T. Burr, T. J. Coolidge, S. J. Thorndike, Alden Speare, C. W. Pierce, G. A. S. Johnson, W. Dickinson, W. B. Strong, E. Wilder; President, I. T. Burr; Secretary and Assistant Treasurer, E. Wilder; Treasurer and Assistant Secretary, G. L. Goodwin. *Topeka Equipment Co.*—Directors, G. C. Lord, I. T. Burr, L. G. Pratt, W. B. Strong, G. O. Manchester, Ross Burns, E. Wilder; President, G. C. Lord; Treasurer and Assistant Secretary, G. L. Goodwin; Secretary and Assistant Treasurer, E. Wilder. *Las Vegas Hot Springs Co.*—Directors, Alden Speare, I. T. Burr, Chas. W. Pierce, G. B. Wilbur, E. Wilder, W. G. Dickinson, A. S. Johnson; President, Alden Speare; Vice-President, E. Wilder; Secretary and Assistant Treasurer, W. G. Dickinson; Treasurer and Assistant Secretary, George S. Tomlinson.

Atlantic & Pacific.—Mr. S. W. Reynolds has been chosen Secretary and Treasurer, in place of Calvin Littlefield, resigned.

Austin & Mankato.—At the annual meeting in Austin, Minn., last week, the following directors were chosen: J. H. Baker, W. T. Bonniwell, G. C. Burt, W. M. Campbell, H. Foster, C. A. Gilman, J. N. Hall, S. Hidden, J. F. Jones, Wm. Kilzback, T. A. Matthews, W. H. Officer, Harlan W. Page, W. H. Twiford, W. T. Wilkins, J. A. Willard, J. C Wise. The board elected W. T. Bonniwell President; J. A. Willard, Vice-President; J. H. Baker, Secretary; Harlan W. Page, Treasurer; W. H. Officer, Harlan W. Page, J. H. Baker Executive Committee.

Boston, Concord & Montreal.—At the annual meeting in Plymouth, N. H., May 24, the following directors were chosen: Joseph A. Dodge, Plymouth, N. H.; Joseph, P. Pitman, Laconia, N. H.; Warren F. Daniell, Franklin, N. H.; Samuel N. Bell, Manchester, N. H.; Peter Butler, John P. Spaulding, J. Thomas Vose, Boston.

Central Vermont.—At the annual meeting in St. Albans, May 19, the following directors were chosen: J. Gregory Smith, Worthington C. Smith, St. Albans, Vt.; James R. Langdon, Montpelier, Vt.; J. P. Clark, Milton, Vt.; B. B. Smalley, Burlington, Vt.; W. H. H. Bingham, Stow, Vt.; W. H. DuBois, Randolph, Vt.; J. H. Kimball, Bath, Me.; George M. Rice, Worcester, Mass.; B. P. Cheney, Otis Drury, Jacob Edwards, J. W. Emery, Boston. The new directors are Messrs. DuBois and Bingham, who succeed John W. Stewart and Bradley Barlow, who declined a re-election.

Chicago, Rock Island & Pacific.—Mr. W. S. Palm has been appointed Car Accountant, in place of G. E. Weir, resigned.

Concord.—At the annual meeting in Concord, May 25, the following directors were chosen: Benjamin A. Kimball, Concord, N. H.; James W. Johnson, Enfield, N. H.; Samuel N. Bell, Frederick Smyth, Manchester, N. H.; J. Thomas Vose, Francis B. Hayes, Henry C. Shurburne, Boston. Messrs. Hayes, Shurburne and Johnson are new directors, succeeding Josiah Minot, Joseph P. Pitman and Dexter Richards.

Denver & Rio Grande.—Mr. F. C. Nims has been appointed General Ticket Agent.

Dorchester & Delaware.—Mr. John Webster, of East Newmarket, Md., has been chosen President, in place of W. Wilton Byrn, resigned.

East Line & Red River.—At the annual meeting in Jefferson, Tex., May 11, the following directors were chosen: Wm. M. Harrison, E. W. Taylor, T. J. Rogers, W. B. Ward, J. P. Russell, Jefferson, Tex.; John C. Brown, George Noble, W. H. Newman, W. H. Abrams, Marshall, Tex. Messrs. Brown, Noble, Newman and Abrams are new directors, representing the Texas & Pacific Company, which has bought an interest in the road. The board reelected Wm. M. Harrison, President; E. W. Taylor, Vice-President.

East Tennessee, Virginia & Georgia.—It is announced that Col. E. W. Cole, late of the Nashville, Chattanooga & St. Louis, has been appointed General Manager of this road and its leased Memphis & Charleston line, with headquarters at Chattanooga, Tenn. Colonel Cole will have the management of an important line, now extending from Bristol on the Virginia line to Memphis, and to be extended to Norfolk by the lease of the Atlantic, Mississippi & Ohio, as soon as that company's reorganization is completed; possibly also to Selma, if, as seems likely, the company control the reorganization of the Selma, Rome & Dalton.

Knoxville & Cincinnati.—This company was organized at Knoxville, Tenn., May 11, by the election of the following directors; D. A. Carpenter, H. Coffin, M. J. Condon, W. R. Tuttle, W. W. Woodruff, Knoxville, Tenn.; Wm. Cross, Anderson County, Tenn.; R. K. Byrd, J. G. Scott, Roane County, Tenn.; H. S. Chamberlain, Chattanooga, Tenn. The board elected D. A. Carpenter President; H. S. Chamberlain, Vice-President; H. Coffin, Secretary; W. W. Woodruff, Treasurer.

Lake Shore & Michigan Southern.—Mr. W. P. Johnson has been appointed General Passenger Agent, to date from June 1. This is a new office on this road, General Ticket Agent Cary being the chief officer of the Passenger Department. Mr. Johnson has been for many years General Passenger and Ticket Agent of the Illinois Central, and is widely known for his services in that position.

Lawrenceville Branch.—At the annual convention in Lawrenceville, Ga., May 12, the following were chosen: President, Col. T. M. Peeples; Directors, D. M. Born, W. J. Born, J. E. Craig, F. F. Juhan, J. D. Spence, D. E. Strickland.

Manchester & Keene.—At the annual meeting in Keene, N. H., May 20, the following directors were chosen: Geo. B. Twitchell, Keene, N. H.; Dana Sargeant, E. P. Emerson, J. W. White, Wm. W. Bailey, P. Sawyer, Jr., Nashua, N. H.; Charles E. Paige, Lowell, Mass.; Alfred S. Hall, Winchester, Mass.; Francis V. Parker, Boston. The board elected W. W. Bailey, President; Thomas E. Hatch, Clerk; J. W. Buttrick, Treasurer.

Mankato & St. Cloud.—At the recent annual meeting the following directors were chosen: W. T. Bonniwell, Jacob Koons, T. G. Strussguth, W. T. Officer, Harlan W. Page, J. F. Jones, T. C. McClure, C. A. Gilman, H. Stevens, C. J. Beatty, W. M. Campbell, J. C. Wise, J. N. Hall, J. H. Baker, J. A. Willard. The following are the officers for the ensuing year: President, W. T. Bonniwell; Vice-President, J. A. Willard; Secretary, J. H. Baker; Treasurer, T. C. McClure; Executive Committee, C. A. Gilman, W. T. Bonniwell, W. M. Campbell.

Milwaukee & Madison.—The directors of this new company are: Wm. F. Vilas, Madison, Wis.; Isaac Lain, Waukesha, Wis.; Angus Smith, Milwaukee, Wis.; Albert Keep, Marvin Hughitt, M. M. Kirkman, H. C. Wicker, C. C. Wheeler, J. B. Redfield, Chicago. It is organized in the Chicago & Northwestern interest.

Milwaukee, Lake Shore & Western.—The following list of officers has lately been issued: President, F. W. Rhinelander, New York; Vice-President, Wm. H. Guion, New York; Treasurer, Archibald Rogers, Milwaukee; Secretary, Alfred L. Cary, Milwaukee; Attorney, J. P. C. Cottrill, Milwaukee; General Superintendent, H. G. H. Reed, Milwaukee; General Freight and Passenger Agent, H. F. Whitcomb, Milwaukee; Assistant Superintendent, J. Donohue, Manitowoc; Auditor, C. F. Rand, Milwaukee; Cashier and Paymaster, James Blackburn, Milwaukee; General Land Agent, J. O. Thayer, Milwaukee; Master Mechanic, S. Charnley, Manitowoc; Train Dispatcher, C. S. Hayden, Milwaukee; Assistant Train Dispatcher, Harry C. Reed, Milwaukee.

Nashua, Acton & Boston.—This company has elected John C. Moulton President; Henry Parkinson, Vice-President; John B. Goodrich, Clerk; F. D. Cook, Treasurer. The road is leased to the Concord Company.

New Orleans, Mobile & Texas.—Mr. D. B. Robinson has been appointed Superintendent of this road, as reorganized and operated by the Louisville & Nashville Company. His office will be in New Orleans. Mr. Robinson has been superintendent several years under the Trustees.

New York, New Haven & Hartford.—Mr. G. T. Wiswell has been appointed Road-Master of the Hartford Division, with office in Hartford, Conn. Mr. Wiswell was formerly Road-Master of the Troy & Greenfield road, and is Secretary of the International Road-Masters' Association.

Northern Pacific.—Mr. D. R. Taylor has been appointed Superintendent of the Missouri Division, with headquarters at Mandan, Dakota. He was formerly Master of Transportation on the Michigan Central.

Ohio & West Virginia.—At the annual meeting in Columbus, May 20, the following directors were chosen: C. P. L. Butler, Isaac Eberley, M. M. Greene, P. W. Huntington, E. L. Hinman, C. H. Rippey, Columbus, O.; John S. Brasee, Lancaster, O.; J. A. Hamilton, Gallipolis, O.; Geo. McQuigg, Pomeroy, O. The board re-elected M. M. Greene President, and elected Wm. M. Greene Secretary and Treasurer, to succeed C. H. Rippey, Secretary, and P. W. Huntington, Treasurer, both of whom declined a re-election.

Ohio River.—At the annual meeting, May 11, the following directors were chosen: George D. Chapman, Charles R. Abbott, C. O. Hunter, Columbus, O.; John Groce, Circleville, O.; M. Boggs, Chillicothe, O.; Wm. D. Kelly, George Willard, Ironton, O.; John G. Peebles, Portsmouth, O.; John Means, Ashland, Ky. The board elected George D. Chapman President; John G. Peebles, Vice-President; C. O. Hunter, Secretary and Solicitor; John Means, Treasurer.

Pacific Mail Steamship Co.—At the annual meeting in New York, May 25, the following directors were chosen: Jay Gould, T. W. Park, Sidney Dillon, Russel Sage, C. P. Huntington, C. G. Francklyn, E. H. Perkins, Jr., G. A. Hoyt and G. B. Houston. The change is a complete one, and shows that the company is now entirely controlled by the Pacific railroad companies.

Pennsylvania.—Mr. Spencer Meade has been appointed Assistant Engineer of Maintenance of Way in the Middle Division, in place of Wm. M. Phillips, transferred.

Mr. Caleb Wright has been appointed Chief Train Dispatcher of the Amboy Division, in place of E. R. Shubrick, resigned.

Philadelphia & Reading.—The United States Circuit Court in Philadelphia has appointed Franklin B. Gowen, Edwin M. Lewis and Stephen A. Caldwell Receivers. Mr. Gowen is well-known as President of the company; Mr. Lewis has made a good record as Trustee of the Jay Cooke estate in bankruptcy, and Mr. Caldwell is President of the Fidelity Trust, Insurance and Safe Deposit Company of Philadelphia.

Mr. Newton R. Turner has been appointed Division Freight Agent and will have charge of all merchandise freights in connection with other roads, and of the lumber traffic, both through and local. Mr. Jacob R. Spohn has been appointed Division Freight Agent with charge of merchandise freights on the main line and Reading & Columbia road, and of the iron traffic, both through and local. Offices at No. 417 Walnut street, Philadelphia.

Railway Purchasing Agents' Association.—At the annual meeting in Chicago last week the following officers were chosen: President, G. C. Breed; First Vice-President, W. S. Cuddy; Second Vice-President, W. R. Shelby; Secretary and Treasurer, Willard A. Smith.

Southern Car Mileage Clearing House Association.—This association was organized in Chattanooga, Tenn., May 26, by the election of the following officers: President, J. A. Burns, Western & Atlantic; Vice-President, S. B. McConnico, Chicago, St. Louis & New Orleans; Secretary, H. C. Ansley, Atlanta & Charlotte Air Line; General Agent, R. C. Robson, late Atlanta Agent of the Green Line.

Texas & St. Louis.—The new board, whose election was noted last week, chose J. W. Paramore, President; W. M. Senter, Vice-president; H. G. Askew, Acting Secretary. The following appointments were made: R. H. G. Minty, Superintendent, office at Texarkana; L. L. Losey, Treasurer; Ex-Gov. R. B. Hubbard, General Attorney; H. G. Askew, Auditor.

United New Jersey.—At the annual meeting in Trenton, May 25, the following directors were chosen: John C. Barrow, Benjamin Fish, John G. Stevens, Robert F. Stockton, Trenton, N. J.; Ashbel Welch, Lambertville, N. J.; Alfred L. Dennis, Newark, N. J; Isaac W. Scudder, Jersey City, N. J.; Wm. Bucknell, Thomas McKean, Samuel Welsh, Philadelphia; John Jacob Astor, Robert Lenox Kennedy, New York. Charles A. Butts is state director. Messrs. Barrow and McKean are new directors, succeeding Cambridge Livingston, deceased, and Hamilton Fish.

West Jersey.—Mr. Walter Freeman has been appointed General Freight Agent, in place of S. B. Kingston, deceased. Mr. Freeman is also General Freight Agent of the United Railroads of New Jersey Division, Pennsylvania Railroad.

PERSONAL.

—Mr. C. W. Douglas has resigned his office as Superintendent of the New York & Greenwood Lake road, to accept a position on the New York & Sea Beach road.

—Mr. E. R. Shubrick, Chief Train Dispatcher of the Amboy Division, Pennsylvania Railroad, has resigned on account of ill health, after 20 years' service on the road.

—Mr. H. L. Leach, formerly Manager of the Hinkley Locomotive Works, has been appointed Agent of the Cape Ann Forge Company, with offices at 77 Water street, Boston.

—At the recent annual meeting of the Atchison, Topeka & Santa Fe Company, appropriate resolutions were passed, expressing regret for the death of the late Joseph Nickerson, long a director of the company, and respect to his memory.

—Judge Othniel S. Williams, a prominent lawyer of Clinton, N. Y., and President of the Utica, Clinton & Binghamton Company, died suddenly May 20 at his residence, to which he had just returned from a visit to Aiken, S. C., for his health. He was sixty-four years old.

—Mr. W. W. Wilcox, from 1865 to 1875 Master Car-builder of the Chicago, Burlington & Quincy Railroad, died at his residence in Aurora, Ill., May 12, aged 69 years. Mr. Wilcox was a native of Connecticut, but spent most of his active life in Detroit, where he was a leading builder and held many positions in the city government.

—Mr. D. V. Touzalin, General Agent of the St. Louis & Rock Island Division of the Chicago, Burlington & Quincy, died very suddenly of pneumonia at his home in Rock Island, Ill., May 18. Mr. Touzalin had been in the employ of the company for 14 years, and was brother of A. E. Touzalin, General Manager of the Burlington & Missouri River, in Nebraska.

—Mr. Max Hjortsberg, whose injury by a train on the Illinois Central road was noted recently, died at his home in Chicago, May 16. His injuries were serious, but there was every prospect of his recovery, but he died suddenly and unexpectedly, a loosened clot of blood from one of the bruised arteries having passed through the heart and blocked the pulmonary artery, stopping all circulation and causing instant death. Mr. Hjortsberg was born in Stockholm, Sweeden, Nov. 8, 1826, and was, therefore, at the time of his death, nearly 54 years of age. He studied civil engineering when quite young, and at the early age of nineteen went to England, where he was given charge of the construction of the docks at Hull—a work of great importance both in a commercial and engineering point of view. In 1852, he came to this country and engaged in railroad building in Southern Indiana and Missouri. He reached Chicago in 1854, and in the year following became Chief Engineer of the Chicago, Burlington & Quincy Railroad, a position which he filled with credit to himself and satisfaction to the company which employed him until about a year ago. During the period of twenty-five years he did all the important engineering work of the road in Illinois, including the building of the massive structure which spans the Mississippi at Burlington. Latterly he became the Constructing Engineer and Architect of the new Pullman Car Works at Kensington, the scene of the accident which in the end proved fatal to him. Mr. Hjortsberg was also a member of the Lincoln Park Board of Commissioners, the Historical Society, the Engineers' Club of the Northwest, and the British Institution of Civil Engineers. He was a man of wide culture and prominent standing in the profession which he had so successfully followed. He was twice married and leaves a widow, but no children. Mr. Hjortsberg was a man of the highest character and severest probity, not only learned in his profession, but of broad general culture and elegant tastes. He had great pride in his profession and was especially earnest that a lofty character should be maintained in it.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending Dec. 31:	1879.	1878.	Inc. or Dec.	P. c.
Pitts., Ft. Wayne & Chicago	$8,452,383	$7,830,109	I. $622,274	7.9
Net earnings	3,951,254	3,689,196	I. 262,058	7.1
Four months ending April 30:	1880.	1879.		
Central, of New Jersey	$2,526,822	$2,002,227	I. $524,595	26.1
Houston & Texas Central	1,077,384	873,325	I. 204,059	23.4
Net earnings	415,913	291,232	I. 124,681	42.8
Northern Central	1,406,810	1,201,645	I. 205,165	22.1
Net earnings	491,823	399,136	I. 92,687	23.2
Pennsylvania	12,794,681	10,314,555	I. 2,480,126	24.4
Net earnings	5,605,111	4,210,570	I. 1,394,541	33.1
Pitts., Titusville & Buff	167,593	.....	....	....
Texas & Pacific	827,423	.....	....	....
Union Pacific	5,256,907	4,175,302	I. 1,081,695	25.9
Month of April:				
Houston & Texas Central	$247,807	$158,318	I. $89,489	55.5
Northern Central	386,130	328,849	I. 57,261	17 4
Pennsylvania	3,488,367	2,630,023	I. 858,344	32.6
Net earnings	1,495,583	1,031,029	I. 464,554	45.0
Texas & Pacific	173,000	104,103	I. 68,897	66.2
Second week in May:				
Chi. & Eastern Ill.	$26,960	$13,119	I. $13,841	105.7
Flint & Pere Marquette	25,941	21,796	I. 4,145	19.0
St. L., Iron Mt. & So	91,200	79,212	I. 11,988	15.1
Week ending May 7:				
Great Western	$87,412	$74,716	I. $12,696	17.0
Week ending May 14:				
Great Western	$87,213	$71,007	I. $16,206	22 8
Week ending May 15:				
Grand Trunk	$198,643	$149,484	I. $49,159	32.9

Coal Movement.

Toal tonnage for the week ending May 15 are reported as follows:

	1880.	1879.	Inc. or Dec	P. c.
Anthracite	390,117	540,573	D. 150,456	27.8
Semi-bituminous	82,927	63,975	I. 18,952	29.6
Bituminous, Penna	61,961	34,578	I. 27,383	79.1
Coke, Pennsylvania	23,534	23,147	I. 387	1.7

The failure of the Philadelphia & Reading Company will

not, it is expected, cause much change in the present relations of the anthracite companies. The receivership continues President Gowen at the head of the management.

Coal shipments from Seattle, Wash. Ter.. in April were 16,275 tons; for the four months ending April 30, they were 38,980 tons. April shipments were the largest on record.

Grain Movement.

For the week ending May 15, receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the past seven years:

	Northwestern	—Northwestern shipments.—		P. c.	Atlantic
Year.	receipts.	Total.	By rail.	by rail.	receipts.
1874	3,930,515	4,110 859	904,240	22.0	3,492,012
1875	2,280,422	2,416,771	850,929	35.2	1,891,558
1876	2,022,02)	3,618,474	2,016,304	55.7	3,941,860
1877	2,506,649	1,997,738	758,450	37.9	2,575,025
1878	4,896,219	4,115,751	1,806,111	45.4	6,359,345
1879	3,510,383	6,229,747	1,982,501	31.8	4,549,127
1880	4,087,754	4,963,889	1,250,589	25.2	6,152,638

The receipts of the Northwestern markets for the week are the largest of the year, as well as larger than in the corresponding week of any previous year. The shipments of these markets have been exceeded twice this year and in the corresponding week of last year. Last year, though rail rates were extremely low, the lake shipments were considerably larger than they were this year. The rail shipments were positively large, and small only in comparison with the years when a rate of 20 cents or less was ruling. The receipts of Atlantic ports were more than twice as great as the week before, and have been exceeded but once this year.

Of the Northwestern receipts, Chicago had 56.3 per cent.; Toledo, 13.6; St. Louis, 11.6; Peoria, 8.7; Milwaukee, 6.9; Detroit, 1.8, and Cleveland 1.1 per cent.

Of the receipts of Atlantic ports New York had 71 per cent., Philadelphia, 10.7; Montreal, 5.5; New Orleans, 5.3; Baltimore, 3.8; Boston, 3.6; and Portland, 0.1 per cent. This is the first week that canal boats from Buffalo arrived at New York throughout the week, and the result is seen in the enormous receipts there, which were exceeded in but three weeks during the tremendous rush of grain last fall and but twice in 1878, and have never been approached in a spring week before. These receipts were *three times as great* as those of the previous week, and New York's proportion of the total sea-board receipts has not been so large before since November, 1877. At all other ports, except Montreal and New Orleans (which also receive by water), the receipts were smaller than usual, though at Philadelphia and Baltimore not so small as the week before. This is evidently the effect of maintaining rail rates more than usual of late years above water rates, which tends to send the grain by the water routes and to those ports which receive by such routes.

Petroleum.

Stowell's *Petroleum Reporter* gives the following statement for the Pennsylvania oil fields for the month of April, in barrels of 42 gallons:

	1880.	1879.	Inc. or Dec.	P. c.
Production	2,019,690	1,530,450	I. 489,240	32.0
Shipments	842,268	1,136,188	D. 293,920	25.9
Stock on hand, April 30.	10,660,115	6,666,611	I. 3,993,504	59 9
Number of producing wells	12,572	10,882	I. 1,690	15.5

The pipe line reports give their stock April 30 at 10,530,527 barrels.

Pittsburgh receipts for the month were 65,619 barrels, 2,736 by Allegheny Valley, and the rest by pipe line.

Colorado Rates.

A called meeting of the roads interested in Colorado business was held in Chicago, May 18. There were present Messrs. Marvin Hughitt, W. A. Thrall and W. A. Stennet, Chicago & Northwestern; R. R. Cable and E. St. John, Chicago, Rock Island & Pacific; T. J. Potter and J. R. Wood, Chicago, Burlington & Quincy, and James Charlton, Chicago & Alton. After some informal discussion over the charges of cutting rates on this business, the meeting came to the conclusion that nothing could be done at present. A motion to postpone all action until June 1 was carried, it being also decided that all rates shall be maintained according to the old agreement until that time.

THE SCRAP HEAP.

Railroad Equipment Notes.

The Pittsburgh, Cincinnati & St. Louis shops at Steubenville, O., are to build 12 passenger cars for the road.

The Michigan Car Co., at Detroit, is building 100 box and 100 coal cars for the Buffalo, New York & Philadelphia road.

Wells, French & Co., of Chicago, are turning out 12 box cars a day. They have contracts on hand for the Atchison, Topeka & Santa Fe; Baltimore & Ohio; Chicago, Burlington & Quincy; Chicago, Milwaukee & St. Paul and Chicago, St. Paul & Minneapolis roads.

The Ohio Falls Car Co, at Jeffersonville, Ind., is delivering 100 freight cars to the Cairo & St. Louis road.

Iron and Manufacturing Notes.

A company has been organized to build a rolling mill and foundry in Jefferson, Texas.

J. S. Mundy, of Newark, N. J., has lately removed his business to large, new shops at Nos. 22 and 24 Prospect street, in that city. He is now building a 60-horse-power engine for a mud-dredging machine, with his improved friction drums; also a 150-horse-power engine for the Cambridge Manufacturing Company, besides a number of smaller engines. He has supplied several railroads recently with his improved hoisting and wrecking engines.

In the four days ended the 18th inst. the Edgar Thomson Steel Co.'s B. Furnace (20-foot boshes) made the following yields: 15th, 148 tons 1,320 lbs.; 16th, 155 tons 1,570 lbs.; 17th, 184 tons 180 lbs.; 18th, 169 tons 1,620 lbs.; total for the four days, 658 tons 210 lbs. This is at the rate of 115¼ tons of 2,240 lbs. per week. The consumption of coke in the four days was 693 tons, being a very small fraction over a ton of coke to a ton of iron. On the 14th inst. the company's A Furnace (13-foot boshes) made 108 tons 290 lbs. of iron.—*American Manufacturer.*

Charlotte Furnace, at Scottdale, Pa., has stopped for repairs. The rolling mill is running single turn.

Ohio Furnace, at Ironton, O., has recently gone into blasts.

Rogers Furnace, near Cartersville, Ga., will soon be started up by C. B. Howard, using charcoal for fuel. The labor will be supplied by 75 contracts from the penitentiary.

The Baltimore and Ohio Railroad rolling mill at Cumberland, Md., is running part single and part double turn, with 425 unemployed. The bar mill is fully employed; the iron rail mill has been turned into a girder mill and is making beams for bridges.

The old Empire mill in Cincinnati has been bought by the Cincinnati Rolling Mill Co. Two new scrap furnaces have been added, and the mill is now running on hoop and band iron and merchant bar.

Morgan, Williams & Co., at Alliance, O., have lately furnished a large steam hammer to the Laclede Rolling Mill at St. Louis.

The Reading Iron Co., at Reading, Pa., formerly Seyfert, McManus & Co., has suspended payment on account of the failure of the Philadelphia & Reading Coal & Iron Co. Arrangements have been made, however, to continue work, in order to fill orders now on hand.

The Indianapolis Rolling Mill is making 35-lb. rails for the Danville, Olney & Ohio River road.

Bridge Notes.

Wells, French & Co., of Chicago, are building 20 spans of bridges for various roads.

The Trustees of the New York & Brooklyn (East River) Bridge will receive at their office, No. 21 Water street, Brooklyn, N. Y., until June 7, bids for furnishing about 510 tons of galvanized steel wire rope required for over-floor stays and storm cables; also for 121 tons of steel suspender rods, stirrups, connecting rods, etc. Plans and specifications can be had on application at the office.

Prices of Rails.

Steel rails are still unsettled with quotations $62.50 to $65 per ton at mill, though some large sales are said to have been made at $60 for fall delivery. Foreign steel rails are offered at $60 per ton at tide-water.

Iron rails are also unsettled. A number of sales are reported at $48 to $50 per ton at mill for heavy sections. Buyers are said to be generally holding back for lower prices.

Old iron rails are quoted at $25 to $27 per ton in Philadelphia, but the market is uncertain.

British Rail Exports.

For the month of April and for the four months ending with that month the exports of steel and iron rails from Great Britain to the United States and to all countries have been, in tons:

		1880.	1879.	Increase	P.c.
April:					
To United States	Steel	7,075	.....	.....	.....
	Iron	13,727	.....	.....	.....
	Total	20,802	.....	.....	.....
To all countries	Steel	45,287	25,401	19,886	78.3
	Iron	16,804	3,756	13,048	350.0
	Total	62,091	29,157	32,934	113.0
Four months:					
To all countries	Steel	122,242	77,905	44,337	56.9
	Iron	49,600	14,261	35,339	247.7
	Total	171,842	92,166	79,676	86.5

Of "railroad iron of all sorts," which includes considerably more than rails, the increase in the total exports for the four months was 79,444 tons, or 86.8 per cent., and 63,250 tons of this increase was in exports to the United States; for the month of April the increase in the total exports was 35,784 tons, or 108 per cent., and 21,067 tons of the increase was in exports to the United States. Thus the chief part, but not the whole, of the increase in railroad iron exports has been due to the demand from this country.

The chief customers for this kind of iron, aside from the United States (which 32½ per cent. of the total exports for the four months this year against *one* per cent. last year), were British India, which took 26.9 per cent.; Australia, 10.7 per cent.; British North America, 6.3 per cent.; Brazil, 4.1 per cent. The increased demands this year has been almost wholly from the United States, India and British America. The British colonies and the United States together took 78¼ per cent. of the total exports this year and 60½ last year. The quantity taken by the colonies altogether has been 90,555 tons this year, against 70,613 last.

Probably the *sales* to the United States nearly ceased with April, but the exports on contracts made during the fall and winter may show considerable amounts for some time to come, though probably much less than heretofore this year.

A Locomotive with a Bell 130 Years Old.

Maj. U. L. Boyce has purchased, at the cost of $100, a bell, formerly the property of Lord Fairfax, of Greenway Court. It was brought from England, where it was cast in 1750—that date being stamped upon it, and weighs 80 lbs. This bell was presented to the Meade Memorial Church, of this village, and was sold for the use and benefit of said church to Maj. Boyce, who, we understand, intends presenting it to the engine "Fairfax," of the Shenandoah Valley Railroad.—*Winchester (Va.) News.*

OLD AND NEW ROADS.

Baltimore & Ohio.—On May 24 this company began to run a fast express train making the run from Chicago to Washington in a little under 28 hours, or about seven hours less than the time previously made. This is not extraordinary time, being about 29 miles an hour for the whole distance, but it is faster time than is now made by any of the lines between Chicago and the East. The train runs through to Baltimore by way of Washington, and will make close connections for Philadelphia and New York. The return train from Baltimore makes about the same time. This train is put on to enable passengers to make the journey between New York and Chicago by this route (which is 124 miles longer than that by the Pennsylvania road) as quickly as by the other trunk lines.

The Baltimore *Gazette*, of May 25, says: "Messrs. William Keyser, Second Vice-President of the Baltimore & Ohio Railroad Company, and J. K. Cowen, counsel, called upon the municipal authorities yesterday and renewed their offer to pay off at once the balance of the 1890 $5,000,000 loan of the city to the company that is still due the sinking fund. Within the last month or two the railroad officials have made repeated offers to free themselves of the debt and as repeatedly have the finance commissioners refused to accept the money. Upon the object of the visit being made known yesterday Mayor Latrobe consulted with the finance commissioners and the city law officers and again refused to accept the offer. In 1854 the city loaned to the Baltimore & Ohio Railroad stock or certificates to the amount of $5,000,000 at 6 per cent. interest, accepting as security a mortgage on the franchise and property of the company and retaining $500,000 worth of the stock issued. The remaining $4,500,000 worth of stock was sold to the highest bidders, being made redeemable Jan. 1, 1890. The $500,000 retained by the city was held as the basis of a sinking fund for the payment of the loan when it became due. Through the accrued interest on the investments and the judicious use of the money the sinking fund now amounts to $2,226,000, leaving a balance yet to be raised of $2,774,000—the amount which the railroad is desirous of paying. The city refuses to accept the offers of payment because its bonds could not be redeemed until January, 1890, and until that time—a period of nearly ten years—the interest would have to be paid on the loan. The wish of the railroad to redeem the loan is due to the fact that money can now be obtained at a much less rate of interest than is paid on the loan in question. The Counsel of the company, it is stated, is of the opinion that the city can be compelled by legal proceedings to accept the payment, but the city law officers support the position of the finance commissioners."

Burlington & Missouri River in Nebraska.—The Republican Valley line is now completed to Indianola, Neb., 30 miles westward from the late terminus at Arapahoe and 120 miles from the main line at Hastings. Trains are now running regularly to the new terminus, where large stock-yards have been built. This is to be the terminus of the road.

A branch of the Republican Valley line is now being built from Red Cloud, the point where it reaches the Republican River and turns west, nearly due eastward. It is now completed from Red Cloud to Spring Valley, 25 miles, and grading is going on rapidly from Spring Valley east. This line is supposed to be going to Beatrice.

Regular trains are now running to Columbus over the leased Atchison & Nebraska road, or rather its Lincoln & Northwestern extension.

Postal cars are to be put on this road between Omaha and Hastings from July 1, and three cars are being built in the company's shops for this run. They are built after plans furnished by the postal authorities.

Chattanooga Western.—This company has been organized to build a narrow-gauge road from Chattanooga, Tenn., westward around the bend of the Tennessee to the Alabama line. The distance is about 35 miles. The object of the road is to reach several deposits of iron and coal now inaccessible.

Cheraw & Salisbury.—This road is reported finished from Cheraw, S. C., northward to Bennett, N. C., on the Carolina Central, seven miles east of Wadesboro, a distance of 23 miles. The road was begun several years ago, and is an extension of the Cheraw & Darlington.

Chicago, Rock Island & Pacific.—The Atlantic & Southern Branch is to be built from Atlantic, Ia., southward to the Missouri line, an organization having been formed for that purpose.

The Keosauqua & Southwestern Company has also been formed to build a branch from a point on the Keokuk & Des Moines Division to Keosauqua, about four miles. The road will be owned and worked by this company.

Chicago, Pekin & Southwestern.—Receiver Reed reports for April as follows:

Balance, April 1	$9,633.61
Receipts from all sources	43,648.25
Total	$53,281.86
Disbursements	38,048.59
Balance, May 1	$15,233.27

The receipts exceeded the disbursements by $5,599.66 for the month.

Cincinnati, Wabash & Michigan.—This company proposes to build an extension from Goshen, Ind., north by west to Benton Harbor, Mich., 53 miles, provided the people on the line will subscribe enough to pay for the right of way and the grading. At Benton Harbor connection would be made with the Chicago & West Michigan road.

Columbus & Maysville.—The officers of this company are now trying to secure aid for the building of the road in Columbus, O., both from the merchants of that city and from connecting lines. It has been decided to make the road of standard instead of 3-ft. gauge. The line is from Columbus to Aberdeen on the Ohio River opposite Maysville, Ky., about 109 miles. Of this 19 miles, from Hillsboro to Sardinia, is completed, this section being of the narrow gauge.

Concord.—At the annual meeting in Concord, May 25, a formal protest was filed against the voting of 3,289 shares held by the Northern Railroad Company, and nearly all who voted on large blocks of stock were required to swear to their ownership. A pamphlet protesting against the continued control of the road by the present management, and charging that it was worked in the interest of the Northern and the Boston, Concord & Montreal companies, was circulated among stockholders.

Danbury & Norwalk.—This company will receive until July 1 bids for $100,000 new 6 per cent. bonds, having 40 years to run. These bonds are to replace an equal amount of 7 per cent. first-mortgage bonds, which will become due Oct. 1 next. The company has 34 miles of road with a total bonded debt of $500,000, or $14,700 per mile. It has always earned its interest, and in most years a dividend on the stock also.

Dayton & Southeastern.—The track is now laid to the terminus at Wellston, O., 116 miles from Dayton, and seven miles beyond the late terminus at Coalton. The company now owns 108½ miles of road, its trains using the Marietta & Cincinnati track (with a third rail) from Baker Junction to Byer Junction, 7½ miles. The extension from Mussellman to Wellston has been built by the Receiver under order of Court, and by consent of parties to the suits against the company.

Deadwood & Redwater.—Work is soon to be begun on this road, the final location having been completed. It is to run from Deadwood, Dak, in the Black Hills, to the coal fields on the Redwater River.

Denver & Rio Grande.—The Colorado Springs *Gazette* says of the progress of this road: "The New Mexican extension leaves the Rio Grande River at Alamosa, and the part completed runs in a straight line to Conejos, a distance of about 30 miles. The distance is a little west of south. The part of the San Luis valley through which it passes is desolate and barren. The only relief to this waste is the 400 miles of mountain range, fencing in the valley, which may be taken in at a glance. At the southern part of the valley, serving as a boundary, is San Antonio mountain, which is huge, round and flat. About ten miles down the river is the Mormon settlement, which has recent addition of about 500 members. The station of the road at this point is called San Antonio, and is about one-half a mile from Conejos. This is the point where the San Juan Extension branches, and as it will be the junction of two long lines, is likely always to be a considerable town.

"The road from this point takes a southeasterly course and passes to the right of Mount San Antonio. It then takes nearly a southern direction until it strikes the Rio Grande at the Rio Grande cañon, at an elevation of 1,000 ft. above the river. Here the road descends rapidly for about six miles, when it reaches the river. At this point will be the next station on the extension. Carlile, Orman & Cook have a large force grading on this line. (They have 800 men at work on the New Mexican & San Juan extension.) The road is graded about 40 miles south of San Antonio.

"The San Juan extension takes an almost westerly direction to the Animas River and then runs up to Silverton, the objective point. The distance from Silverton to Alamosa by this route is 234 miles. Great effort was made to get over

the range near the headwaters of the Rio Grande, which would have made the distance to the same point only 140 miles, 94 miles less. But a place to cross the range could not be found at an elevation less than 12,000 ft., and in this place there were great dangers from snowslides, and hence the southern route was taken. It follows up the San Antonio River to the mountains and crosses a spur of the mountains between the rivers Chama and Los Pinos. This is at an elevation of 9,000 ft. The grade in the ascent is only 75 ft. to the mile. The scenery is said to surpass that of Veta pass. The road then descends 2,000 ft., and crosses the Continental divide at an elevation of 7,000 ft. This extension is completely graded for a distance of 25 miles, and partially so 40 miles west of San Antonio. About 25 miles out there are three tunnels to avoid a heavy grade, respectively of 500, 300 and 200 ft. The 300 ft. tunnel is nearly complete, and the others are being worked as rapidly as possible. The snow is a temporary obstacle in the way of grading beyond the point at which it is now completed. Soon after the snow is off the range the road will be in the valley beyond. By Aug. 1, trains will be running over the range, and before winter closes in Silverton will be connected by rail with the outside world."

East Line & Red River.—Grading is now well advanced on the extension of this road from Sulphur Springs, Tex., to Greenville. The present intention is to have the road done to Greenville by Sept. 1.

At the recent annual meeting in Jefferson, Tex., it was announced that one-half interest in the stock had been bought by the Texas & Pacific Company. Directors were chosen to represent that company. The road is of 3-ft. gauge, and is now in operation from Jefferson, Tex., to Sulphur Springs, 93 miles.

Gulf, Colorado & Santa Fe.—Work on this road, north of Brenham, Tex., is progressing steadily, and tracklaying from Brenham toward Caldwell has been begun.

Hannibal & St. Joseph.—A Chicago dispatch of May 26 says: "It has been known here for several days that General Manager Carson and Chief Engineer Dunn, of the Hannibal & St. Joseph Railroad, recently left this city with horse and wagon, bound for Quincy, Ill., and to-day the object of their errand has leaked out. The Executive Committee of the Hannibal & St. Joseph Railroad Company has directed that a survey of a line be made between Chicago and Quincy, with the view of constructing an extension of the Hannibal & St. Joseph Railroad to this city, taking in the towns of Quincy, Carthage, La Harpe, Galesburg, Wyoming, Lacon, Ottawa and Lockport. The distance between Chicago and Quincy by this route is only about 254 miles, as against 263 miles by way of Chicago, Burlington & Quincy, a total distance of 480 miles (from Kansas City), as against 571 miles by way of Hopkins. The estimated cost of the new line, including iron bridges, steel rails, and a full equipment, is $5,000,000. Local aid to the extent of $500,000 is expected. It is understood that a traffic contract is to be made with the Missouri, Kansas & Texas Railroad Company, by which the business of that road is to be given to the new line. It is said this move on the part of the Hannibal & St. Joseph has been decided to be necessary to give that road the influence it is entitled to, and keep it out of the hands of the trunk lines who desire to use it, and that the road will be constructed by a syndicate, to be formed in New York. Gen. Jack Casement was recently in Quincy on business connected with this enterprise, and is to have charge of the construction."

The report is given for what it is worth. Some of the details require confirmation. And it is to be remembered that there is some difference between ordering a survey and building a railroad.

Kansas Central.—This road is now completed to Garrison, Kan., a new town, which is 44 miles westward from the point which the track had reached at the beginning of the year, and 145 miles from Leavenworth. The road is controlled in the Missouri Pacific interest. Regular trains will run through to the new terminus shortly.

Knoxville & Cincinnati.—This company has now been fully organized to build a railroad from Knoxville, Tenn., to connect with the Cincinnati Southern, probably at Emory Gap.

Lake Ontario Southern.—The employés of this road have now nearly five months' pay due them, and a strike is threatened unless some money is forthcoming very soon.

Lake Shore & Michigan Southern.—This company will put up a new and handsome building for its general offices in Cleveland, O. The lot on which it is to stand is 100 by 200 feet. A committee is now considering plans, and the work will probably be begun very soon.

Louisville, New Albany & Chicago.—This company having arranged to do the express business over its own road, the Adams Express Company has secured an order requiring the road to continue to carry its business as formerly, until a further hearing on the merits of the case.

Manchester & Keene.—Under orders of the Court, Receiver Ramsdell has already put a considerable force at work on this road for the purpose of bringing it into safe condition for the running of trains. It will be opened for business as soon as possible.

Milwaukee & Madison.—This company has filed articles of incorporation in Wisconsin. It is organized to build the Chicago & Northwestern's proposed line from Milwaukee by Waukesha and Jefferson to Madison.

Missouri, Kansas & Texas Extension.—This company, which includes the former Denison & Pacific and the Denison & Southeastern Companies, is pushing work actively on the extension to Greenville. A large part of the grading is done.

At a special meeting of the company in Denison, Texas, May 22, a resolution was passed authorizing a lease of the road to the Missouri, Kansas & Texas. This is merely a matter of form, as that company owns all the stock.

Missouri Pacific.—A new suit has been begun in the United States Circuit Court in St. Louis to set aside the foreclosure of the old third mortgage and the sale by which the road was transferred to the present company. As in the former suit, the bill charges that the foreclosure proceedings were fraudulent and collusive and were intended to deprive the stockholders of their interest in the road unjustly. The bill asks that a receiver be appointed pending the trial of the case.

Nashua & Lowell.—A partial compromise has been effected in the controversy between this company and the Boston & Lowell. That company agrees to reduce its charge for transferring freight from the Nashua road to other lines in Lowell from 40 to 20 cents per ton. The compromise was secured by the intervention of the Old Colony Company.

New York & New England.—At the special stockholders' meeting last week, Vice-President Wilson, referring to the increase in earnings, said: "This shows an ample margin on business done under the strongest competition. We should have from $750 to $900 per day net earnings, too, on added business for which negotiations are now being made. Negotiations are on foot for a million bonds at the reduced rate of 6 per cent. Arrangements are in progress for the road's extension to the Hudson River. The whole line will be open at an early date; 750 box-cars, 150 flat-cars, eight passenger-cars and seven heavy mogul engines are contracted for, at a cost of $500,000, which will yield an added revenue of 12 per cent. on the outlay." General Wilson described the proposed system of floats on the Hudson. He said that a large percentage of earnings was expected on both the New York and Pennsylvania business of the road. He stated also, in reply to a question, that the road, upon completion to the Hudson, would connect with the branch which the New York, Ontario & Western (the late New York & Oswego Midland) intends to build to Newburg, securing a line to Oswego.

Sealed proposals will be received by Chief Engineer L. B. Bidwell at his office, No. 244 Federal street, Boston, until June 7, for dredging about 163,000 cubic yards from Boston harbor near this company's terminal grounds at South Boston, making a uniform depth of 23 feet at low water; also for dredging about 147,000 cubic yards near the proposed wharf; also for placing and leveling the material dredged on what is known as the 12-acre tract of the company, adjoining the present terminal grounds. Further information may be had at the office as above.

Northern Pacific.—Some indication of the settlement of the country on the line of this road in Western Dakota may be had from the entries of government land at the Bismark land office, which was established in 1874, which has charge of the sales from near Jamestown west to the Montana line—that is, for all the Dakota land near this road, excepting for about 75 miles west of the Minnesota line. For forty miles on each side of the road half the sections belong to the railroad company, and two in every township are reserved for school purposes, so that but 14 sections out of 36 in each township are open to entry at the land office. Down to the end of April last, there had been 638 different entries in this district, none of which, probably, were of more than 160 acres. It is claimed, however, that considerable unsurveyed land, which cannot be entered till surveyed, has been occupied. The Bismark *Tribune* says: "There are fully as many actual settlers on the surveyed railroad lands as there are on the government lands, and a greater acreage under cultivation." It must be remembered, where most of the cultivated land in this part of Dakota lies, is in another land district. Here about 500,000 bushels of wheat were shipped at the single station of Fargo last year. At the land office there were 8,000 entries, covering about 1,200,000 acres in 1879 alone.

Pennsylvania.—This company's statement shows for the month of April on all lines east of Pittsburgh and Erie, as compared with April, 1879:

An increase in gross earnings of (32.6 per cent.)	$858,344
An increase in expenses of (24.6 per cent.)	393,790
Net increase (45.0 per cent.)	$464,554

For the four months ending April 30, as compared with the same period in 1879, the same lines show:

An increase in gross earnings of (24.4 per cent.)	$2,480,126
An increase in expenses of (17.8 per cent.)	1,085,585
Net increase (33.1 per cent.)	$1,394,541

For the four months all lines west of Pittsburgh show a surplus over all liabilities of $1,291,454, being a gain of $1,238,671 over the same period last year.

This company put on this week a new fast train which is to run from Philadelphia to Chicago in 23½ hours and from New York to Chicago in a little under 26 hours. This is done in opposition to the Baltimore & Ohio's new fast train, not for New York business, but for that of Philadelphia, Baltimore and Washington.

Philadelphia & Reading.—The long-expected collapse of this company came, with little immediate warning, on May 21, when the following notice was issued by order of the board of managers:

"The Philadelphia & Reading Railroad Company, and the Philadelphia & Reading Coal & Iron Company, have been compelled to suspend payments. The managers will take immediate measures to protect intact the property of both companies, and continue the business; for this purpose the daily revenues will be applied so far as required to the payment of wages and supplies."

Two immediate causes are assigned for the suspension. One is the dullness of the anthracite trade and the partial stoppage of production, reducing the company's income. The other is the impossibility of procuring temporary loans to meet current expenses. The company's credit has not been of the best for some time past, but it has been able to borrow a good deal of money or collaterals. But lately, it is said, it has not been possible to do this in Philadelphia, and the New York banks, which have at times made large loans to the company, have refused further accommodation. Another motive for the present action may have been that, by the terms of agreement with the bondholders, scrip payments of interest were to cease and cash payments begin again on July 1 next. At any rate, the stoppage was inevitable, and a few months more or less could make no great difference.

The liabilities of the two companies, as given in the report for the year ending Nov. 30 last, may be briefly stated as follows:

RAILROAD COMPANY.	
Stock	$34,278,175
Bonded and debenture loans	77,924,761
Floating debt proper	7,550,079
Current balances, sinking funds, etc	4,100,200
Total	$123,853,215

COAL AND IRON COMPANY.	
Stock, all held by Railroad Co	$8,800,000
Bonds and mortgages held by R. R. Co	39,737,965
Mortgages and debenture loans	15,324,899
Floating debt	1,507,837
Due to R. R. Co	5,253,949
Current bills and accounts	895,289
Total	$70,719,934

Deducting the liabilities of the Coal & Iron Company held by the Railroad Company, there remains a balance of $141,581,235; deducting from this the stock, the net liabilities of the company amount to $107,303,060. The property of the two companies is undoubtedly of great value, but hardly sufficient to realize at once on this enormous debt. As is well-known, the company has carried it with very great difficulty for several years, and the condition of the coal trade has prevented any substantial improvement in its condition.

Proceedings against the company were at once begun in the United States Circuit Court in Philadelphia by Mr. Moses Taylor of New York, a large creditor, and on May 24 that Court granted an order for the appointment of Receivers. Counsel in the case named for the position Mr. Franklin B. Gowen, President of the company and Edwin M. Lewis, President of the Farmers' and Mechanics' Bank of Philadelphia and Trustee of the Jay Cooke estate; the Court accepted these, and added Mr. Stephen A. Caldwell, President of the Fidelity Trust and Insurance Company, of Philadelphia. These Receivers have filed the necessary bonds and taken possession. They promise a full statement soon.

The same Receivers have been appointed by the United States Circuit Court in New York in concurrent proceedings. A suit has been begun by the Receiver of the New Jersey Central for traffic balances due, but it will probably not be pressed, being intended merely to protect the claim of that road

Pittsburgh & Lake Erie.—The inclines and barge-ferry have been completed by which cars are to be transported across the Monongahela River at Pittsburgh, between the tracks of this road and the Baltimore & Ohio. The transfer can be quickly made, and a considerable business is expected to pass between the two roads.

Rochester & State Line.—Testimony was taken last week in the suit of the city of Rochester to recover $600,000 bonds of this company on the ground that certain contracts have not been complied with. The testimony is now all in, and June 25 has been fixed as the time for hearing arguments in the case.

St. Louis & San Francisco.—The track of the Kansas Division is now laid to Wichita, Kan., 21 miles westward from the late terminus at Augusta, 218 miles from the main line at Peirce City, Mo., and 507 miles from St. Louis. At Wichita connection is made with a branch of the Atchison, Topeka & Santa Fe, which reaches the main line of that road at Newton. From St. Louis to Newton by the line just completed the distance is 533 miles, against 515 by way of Atchison, or 484 by Kansas City.

This company is now receiving sealed proposals for an equipment loan of $1,000,000, to bear interest at 7 per cent. The bonds are to have 12 years to run and a sinking fund payment of 8 per cent. is to begin with June, 1882, to be used in retiring the bonds at not over 105. The bonds are to be issued at the rate of 90 per cent. of the actual cash cost of equipment to be purchased for the use of the company. One-half—$500,000—will be ready for delivery by June 1, the balance at the option of the company during the current year.

St. Louis, Iron Mountain & Southern.—The United States Circuit Court in St. Louis has enjoined this company from interfering with the business of the Southern Express Company over its road until a further hearing in the case, which is set for June 7. The company had given notice that it would transact its own express business after June 1.

Seaside Elevated.—This company has been organized to build an elevated railroad from the west to the east end of Coney Island, connecting all the summer resorts on the island. It will be about five miles long.

South Carolina.—A dispatch from Charleston, May 25, says: "The litigation in the South Carolina Railroad suit, which has occupied the attention of the United States Circuit Court, Chief Justice Waite and Circuit Judge Bond presiding, since May 20, came to a close to-day. It was an action for the foreclosure of the second mortgage, to secure certain bonds illegally disposed of by the company, for an injunction against the use of certain bonds purporting to be secured by the first and second mortgages, and for the sale of the mortgaged premises. The complainants' counsel produced abundant documentary evidence to show that the second-mortgage bonds had been used in exchange for non-mortgage bonds, as collateral security to liquidate the floating debt, and for other purposes clearly in violation of the stipulations in the mortgage agreed upon between the bondholders and the company. They also claim that the persons who accepted these bonds as collateral security for loans did so knowing that the action was unlawful, and that they were consequently not entitled to consideration in the final settlement. They further charged that the company withheld important information from the bondholders, and deceived the public by rendering annual reports which were not sustained by the company's books. The counsel representing the syndicate and banks and capitalists holding the bonds in dispute made long arguments to exonerate the defendants and establish the legality of the loan transactions. As both questions left to be decided were the respective rights of the parties holding bonds as the security for the amounts loaned, the Court granted a decree of sale, to take place at some date to be hereafter named, and expressed willingness to hear, in chambers, suggestions on questions involving important principles connected with other points in the case. The final decision will be rendered at Washington in three or four weeks.

"The Court also signed to-day an order for the payment of interest on all the first-mortgage bonds falling due July 1, 1880, unless a decree is filed prior to that date declaring that the pledged bonds are not entitled to security under the first mortgage. The time for registration and proving the second-mortgage bonds was extended to Aug. 1."

South Pacific Coast.—This road has now been completed through to Santa Cruz, Cal., track having been laid on the gap of two miles between the late southern terminus at the big tunnel and Felton, the end of the old Santa Cruz & Felton road, now owned by this company and made a part of its line. The whole distance from the bay terminus at Alameda to Santa Cruz is 79 miles, and from San Francisco to Santa Cruz (including the long ferry across the bay) it is 84 miles. The through trains of this road also run over the Santa Cruz Railroad to Soquel and Aptos, beyond Santa Cruz.

Texas & St. Louis.—At the recent annual meeting resolutions were passed ordering the completion of the road to Waco as soon as possible. The location has been made and the contract for grading from Tyler, Tex., to Waco has been let to R. C. Kerens, of St. Louis.

Tonawanda Valley.—A contract for building this road from Attica, N. Y., to Currier's Corners has been let to Craigie, Rafferty & Yeomans, of Buffalo, who are to begin work at once. Part of the line was graded several years ago.

Union Pacific.—The branch from Grand Island, Neb., northward to St. Paul, 20 miles, has been completed and trains are running over it.

Track laying has been begun on a branch of the Omaha, Niobrara & Black Hills road, which is graded from Lost Creek, Neb., northwest to Albion, 33 miles.

A Salt Lake dispatch says that this company is locating a branch line from Echo, Utah, to Park City. This is on the line of the proposed Utah Eastern road, and this action is probably intended to prevent the building of that road.

Warwick Valley.—The old portion of the road from Warwick, N. Y., to Greycourt, 10 miles, was changed from 6 feet to standard gauge May 24. The extension from Warwick to McAfee Valley, N. J., was already of standard gauge. The company now works the road with its own equipment, the contract under which train service was furnished by the Erie having been terminated.

ANNUAL REPORTS.

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Concord.

This company owns the Concord Railroad fram Concord, N. H., to Nashua, 35 miles; the Hooksett Branch, 7 miles, and the Manchester & North Weare road, 19 miles. It leases the Concord & Portsmouth road from Manchester, N. H., to Portsmouth, 40.5 miles, and the Suncook Valley road, from Hooksett to Pittsfield, 19.5 miles, making 61 miles owned and 121 miles worked. It also leases the Nashua, Acton & Boston road, 20 miles, but its earnings are not included. Part of the business is done under an arrangement for division with the Manchester & Lawrence road. The 39th annual report is for the year ending March 31, 1880.

The Treasurer's trial balance is as follows:

Capital stock ($24,590 per mile)		$1,500,000.00
Det. and contingent		109,935.71
Notes payable		8,438.87
Interest		65,055.70
May dividend		75,000.00
Old dividends, etc		3,001.00
Total		$1,761,431.28
Construction	$1,500,000.00	
Rindges' Wharf	51,507 72	
Manchester & North Weare road	11,534.19	
Mt. Washington R. R	173.61	
Suncook Valley road	63,060.00	
Cash and receivables	135,155.76	
		$1,761,431.28

Notes payable were reduced by $34,437.35 during the year. The company has no funded debt, and no debt of any description which is not fully offset by cash on hand.

The earnings for the year were as follows:

	1879-80.	1878-79.	Inc. or Dec.	P. C.
Passengers	$299,447.91	$278,321.01	I. $21,126.90	7.6
Freight	541,244.80	424,954.68	I. 116,290.12	27.4
Express, mail, etc	29,395.94	29,728.51	D. 332.57	1.1
Total	$870,088.65	$733,004.20	I. $137,084.45	18 7
Expenses	523,356.14	414,157.11	I. 109,199.03	26.4
Net earnings	$346,732.51	$318,847.09	I. $27,885.42	8.7
Gross earnings per mile	7,190.82	6,057.89	I. 1,132.93	18.7
Net earnings per mile	2,865.56	2,634.65	I. 230.89	8.7
Per cent. of exps.	60.15	56.50	D. 3.65	6.5

The earnings show a considerable gain, although through rates were low during the whole year, and a large reduction in the local freight tariff was made in January last. Expenses were increased by the greater volume of business and by increased cost of material. The income account was as follows:

Net earnings for the year		$346,732 51
Tax on capital stock	$35,939.62	
Manchester & Lawrence, joint business	65,581.49	
Rentals of leased lines, including Nashua, Acton & Boston	44,094.00	
Reserved for new buildings and yard at Concord	15,000.00	
New depot at Nashua	20,000.00	
Unsettled claims	3,000.00	
New freight cars	10,000.00	
Dividends, 10 per cent.	150,000.00	
		345,615.11
Balance to contingent account		$1,117.40

The net earnings were sufficient to pay the usual 10 per cent. dividends, after setting aside $45,000 (or 3 per cent. on the stock) for additions to the property.

The traffic for the year was as follows:

Train mileage:	1879-80.	1878-79.	Increase.	P.c.
Passenger	205,032	203,884	1,148	0.6
Freight	278.705	247,157	31,548	12.8
Service and switching	177,341	162,778	14,563	8.9
Total	661,078	613,819	47,259	7.7
Passengers carried	527,063	489,904	37,099	7.6
Passenger mileage	11,081,309	10,580,508	500,801	4.7
Tons freight carried	899,662	674,857	224,805	33.1
Tonnage mileage	29,006,834	21,609,056	7,397,778	34.2
Av. train load:				
Passengers, No.	54.05	51.89	2.16	4.2
Freight, tons	104.08	87.42	16.66	19.1

The Nashua, Acton & Boston road carried 48,214 tons, equivalent to 1,147,290 tons carried one mile, an increase of 250,283 ton-miles, or 35.1 per cent., during the year.

During the year a new engine was bought and one built in the company's shops. All needed repairs were made to cars. More freight cars are needed.

During the year there were put in the track 505 tons steel rails, 857 tons new iron rails, 476 tons repaired rails and 67,917 new ties. There were 6,929 feet of new sidings laid. One bridge was rebuilt and others repaired. Land has been bought for additional yard room at Concord, and the new yard is now being graded.

Buildings have been kept generally in good repair. Contracts have been let for a new depot at Nashua, and for an engine-house and other buildings at Concord.

No person was injured and no property of the corporation seriously damaged by any accident upon the road during the year.

Georgia Railroad & Banking Co.

This company owns a line from Augusta, Ga., to Atlanta, 171 miles, with branches from Camak to Macon, 80 miles; from Union Point to Athens, 39 miles, and from Barnet to Washington, 17 miles, making 307 miles in all. Of the Macon Branch, 76 miles, from Warrenton to Macon, was formerly the Macon & Augusta road; it was built and controlled by this company, was leased Sept. 1, 1878, and was bought under foreclosure of second mortgage March 2, 1880. The report is for the year ending March 31.

The equipment consists of 40 engines; 29 passenger, 2 sleeping, 8 baggage and 3 mail cars; 382 box, 99 Green Line, 31 stock, 136 flat, 59 coal and 15 caboose cars; 1 pay, 19 shanty and 2 wood cars. Two passenger-cars were bought during the year; 100 box, 50 flat and 50 coal cars are now being built.

The general account, condensed, is as follows:

Stock		$4,200,000.00
Bonds		1,581,000.00
Profit and loss		643,128.33
Coupons and dividends unclaimed		33,521.88
Income		497,919.83
Total		$6,955,570.04
Road, real estate and banking h use	$4,252,440.02	
Stocks owned	555,000.00	
Western R. R., purchase and coupon accounts	939,527.26	
Macon & Augusta R. R.	241,963.15	
" " purchase account	506,162.04	
Port Royal & Augusta R. R.	200,000.00	
Cash and receivables	127,173.43	
Income, disbursements	133,304.14	
		6,955,570.04

The company is liable as guarantor on $296,000 Macon & Augusta bonds and on $1,051,500 bonds of the Western Railroad of Alabama, of which road it owns one-half share. This makes the total bonded liability $2,928,500, a net decrease of $276,000 during the year.

The earnings for the year were as follows,

	1879-80.	1878-79.	Increase.	P. c.
Passage	$255,443.91	$189,904.11	$55,539.80	27.8
Freight	785,408.70	731,312.53	54,096.17	7.4
Mails, etc	128,671.53	66,502.26	62,169.27	93.5
Total	$1,169,524.14	$907,718.90	$171,805.24	17.2
Expenses	766,448.93	659,325.92	107,123.01	16.3
Net earnings	$403,075.21	$338,392.98	$64,682.23	19.1
Gross earn. per mile	3,809.50	3,628.06	181.44	5.0
Net earn. per mile	1,313.00	1,230.51	82.49	6.7
Per cent. of exps.	65.50	66.00	....	....

The passenger earnings were largely increased in consequence of a general reduction of rates, which continues to work very satisfactorily. Freight business shows a large increase, though there was a falling off both in through and local cotton. The traffic reported is as follows:

	1879-80.	1878-79.	Inc. or Dec.	P. C.
Train mileage	1,017,797	1,019,478	D. 1,681	0.2
Bales cotton carried	229,336	267,552	D. 38,216	14.3
Bushels grain	1,040,074	1,061,305	D. 21,231	2.0
Barrels flour	88,103	115,984	D. 27,881	24.0
Tons fertilizers	41,409	28,109	I. 13,300	47.3

In spite of the decrease in cotton and grain the general freight business increased. Train mileage was reduced somewhat by the use of heavier engines, which are gradually being brought into use on the road.

The income account was as follows:

Surplus, April 1, 1879		$831,801.76
Bank n tes supposed lost or destroyed		75,856.43
Completion of Macon & Augusta R. R.		46,153.50
Sundry accounts		1,224.44
Net earnings of road		403,075.21
" " of bank		21,437.56
Dividends and interest on investments		73,407.06
Total		$1,452,059.96
Dividends, 6 per cent	$252.000 00	
Interest	93,530.00	
Rent Macon & Augusta to date of purchase	22,129.03	
Incidental expenses, law expenses, etc.	17,045.11	
State taxes of previous years and costs.	37,130.32	
Stock of Macon & Augusta bought	15,000.00	
Sundry accounts	7,781.48	
		445,215.94
Balance, April 1, 1880		$1,007,744.02

The Auditor recommends strongly the adoption of the system of daily balances.

During the year 2,110 tons steel rails, 208,756 new ties and 1,177,385 feet of lumber were used in renewals. There are now 71 miles of steel rail in the main track. Bridges and trestles have been thoroughly repaired, several culverts built where trestles were filled in, new piers put up for the Oconee bridge, and the road generally kept in good condition.

The older engines are being gradually broken up or sold, and replaced by heavier ones.

The company, while believing that its charter exempts it from the operation of the Commission rates lately put in force, proposes trying them as an experiment, but will not raise any of its present rates where allowed to.

Dividends have been received as usual on the Atlanta & West Point and Rome Railroad stock. The business of the Port Royal & Augusta road is improving, but no revenue is derived from the road. Its ultimate value will depend on the possibility of building up an export trade by this route. The great difficulty in the way is the low rates from northern ports and the difficulty of inducing ships to come empty to Southern ports. A small elevator and some other facilities are to be provided at Port Royal in the hope of inducing business.

President Alexander's report says: "The new business for our lines, however, from which we most hope for early results, is the direct business between the West and New York, and other Eastern ports. By means of fine steamer lines now in operation to the ports of Savannah and Charleston, which are also being rapidly increased in power with larger and faster steamers, we believe it possible to make as good time from New York to St. Louis, *via* Charleston and Savannah, and over our roads, as is being made by the all-rail direct lines from New York to the West. And, as our pro-rating distances are as short, we believe that we can secure a very considerable increase of business from these quarters. With this in view, close alliances have been made between this road and the South Carolina and Central railroads, and the steamer lines from Charleston and Savannah to New York, and also with the Louisville & Nashville Railroad Company, and the large system of roads under its control. The alliances are not exclusive, or intended to discriminate against any others of our connecting lines, but are simply to co-operate harmoniously, and as one line, in a concentrated effort to secure a portion of the great business between the West and East over our respective roads. The necessary details and preparations are being worked up as rapidly as possible, and before the next winter we hope to have a thoroughly-organized and efficient line, capable of handling a large business."

Northern (New Hampshire).

This company owns a line from Concord, N. H., northwest to White River Junction, Vt., 69.5 miles, with a branch from Franklin, N. H., to Bristol, 13.5 miles, making 83 miles in all. It also owns a controlling interest in the Concord & Claremont road, and some stock in other lines. The thirty-fifth annual report is for the year ending March 31, 1880.

The equipment consists of 9 passenger and 16 freight engines; 13 passenger, 2 mail and smoking, 1 mail and 7 baggage cars; 412 long and 99 short freight cars; 19 gravel cars.

The balance sheet is as follows:

Stock ($36,969 per mile)		$3,068,400.00
Bills payable		177,000.00
Income		143,687.51
Contingent fund		484,879.73
Premiums, unclaimed coupons, etc		20,574.57
June dividend		89,919.00
Total		$3,984,460.81
Construction	$3,068,400.00	
Northern R. R. stock, 711 shares, cost	37,708.34	
Concord & Claremont R. R.	254,245.72	
Bills receivable	431,850.25	
Materials and fuel	109,393.86	
Cash, contracts, etc	82,862.64	
		$3,984,460.81

Stock remains unchanged. The company has no floating debt that is not greatly overbalanced by the assets, and no funded debt except one bond for $100 due long ago, but never presented for payment.

The traffic for the year was as follows:

	1879-80.	1878-79.	Inc. or Dec.	P.c.
Train mileage	196,620	190,666	I. 5,954	3.1
Freight	302,842	259,773	I. 43,069	16.6
Service	2,676	3,990	D. 1,314	32.9
Total	502,138	454,429	I. 47,709	10.5
Passengers carried	133,012	124,820	I. 8,192	6.6
Passenger mileage	5,410,875	4,725,180	I. 685,695	14.5
Tons freight carried	509,358	397,346	I. 112,012	28.2
Tonnage mileage	32,628,360	25,266,763	I. 7,361,597	29.1
Av. train load:				
Passenger, No	27.52	24.78	I. 3.74	15.0
Freight, tons	107.75	97.25	I. 10.50	10.8

The gain was chiefly in through business. No less than 62.6 per cent. of the passenger mileage and 95.6 per cent. of the tonnage mileage was of business to and from other roads.

The earnings for the year were as follows:

	1879-80.	1878-79.	Inc. or Dec.	P.c.
Passage	$139,403.99	$133,737.42	I. $5,666.57	4.2
Freight	276,119.00	263,530.24	I. 12,588.76	4.8
Mail, express, etc	23,482.75	29,606 21	D. 6,123.46	20.7
Total	$439,005.74	$426,873.87	I. $12,131.87	2.8
Expenses	326,566.89	319,501.85	I. 7,065.04	2.2
Net earnings	$112,438.85	$107,372.02	I. $5,066.83	4.7
Gross ears. per mile.	5,280.23	5,143.06	I. 146.17	2.8
Net " "	1,354.68	1,293.64	I. 61.04	4.7
Per cent. of exps	74.39	74.35	I. 0.04	0.1

Expenses above include $17,271.55 for new rails and $35,043.31 for state tax, the last item a considerable increase over the preceding year. The through business was done at extremely low rates, making the proportion of expenses high. The income account was as follows:

Balance, March 31, 1879		$123,232.97
Gross earnings, as above		439,005.74
Balance (surplus) of interest account		72,867.19
Total		$635,105.90
Expenses, as above	$326,566.89	
Dividends, 5½ per cent	164,851.50	
		491,418.39
Balance of income, March 31, 1880		$143,687.51

The company shows what very few railroad companies can, a balance of interest account on the credit side.

The property has been well maintained. There were used in renewals 803 tons steel rails, 235 tons iron rails and 51,122 new ties; about 2,800 tons of iron rails were repaired and re-laid. One engine and 27 freight cars were rebuilt. The Station at White River Junction is now being built.

Complaint is made of the excessive amount of tax, nearly 33 per cent. on the net income of the previous year. It was paid under protest, as being unjustly levied.

Expenses were kept down by the low prices of material, in spite of the increased traffic. The road was worked without accident during the year.

The Peterboro & Hillsboro road, in which this company is interested has returned no dividends on the investment as yet. The Manchester & Keene road has not been worked, but steps have been taken to have it brought into use.

Western, of Alabama.

This company owns a line from Selma, Ala., through Montgomery to Opelika, 116 miles. At Opelika it forks, one branch running to Columbus, Ga., 29 miles, and the other to West Point, 22 miles, making in all 167 miles of road. It is owned jointly by the Georgia Railroad Company and the Central Railroad Company, of Georgia, who bought it at foreclosure sale in 1875, and have since worked it, dividing the earnings equally, and meeting all interest charges in like manner.

The earnings for the year ending Aug. 31, were as follows:

	1878-79.	1877-78.	1876-77.
Passage	$168,324.52	$174,360.64	$148,567.96
Freight	386,220.89	344,860.75	289,492.80
Other	24,947.32	24,885.72	29,53).67
Total	$579,492.73	$544,107.11	$467,597.43
Expenses	395,498.52	367,454.69	367,072.98
Net earnings	$183,994 21	$176,652.42	$100,524.45
Gross earnings per mile	3,470.02	3,258.12	2,800.00
Net earnings per mile	1,101.77	1,057.80	602.00
Per cent. of expenses	68.25	67.53	78.50

The bonded debt is now $2,103,000, on which the annual charge is $168,240, so that the road is earning more than its interest.

A supplementary statement for the seven months from Sept. 1 to March 31 is as follows:

	1879-80.	1878-79.	Inc. or Dec.	P. c.
Gross earnings	$454,349.25	$397,691.03	I. $56,658.32	14.2
Working expenses	229,072.87	213,193.58	I. 15,879.29	7.4
Taxes	18,528.90	28,752.68	D. 10,223.78	35.5
Rent of rolling stock	21,000.00	21,000.00	....	....
Total	$268,601.77	$262,946.26	I. $5,655.51	2.2
Net balance	$185,747.58	$134,744.77	I. $51,002.81	37.9

Showing a large improvement. For the full year ending March 31 the road was able to pay all charges and to repay its owners $26,740 each—$53,480 in all—on account of previous advances.

Since the close of the last period reported for, the joint owners have leased the 50 miles from Montgomery to Selma to the Louisville & Nashville Company.